



**NAVAL  
POSTGRADUATE  
SCHOOL**

**MONTEREY, CALIFORNIA**

**THESIS**

**COMPARISON OF RETENTION CHARACTERISTICS OVER  
TIME: EVIDENCE FROM THE 1992 AND 1999  
DEPARTMENT OF DEFENSE SURVEY OF  
ACTIVE DUTY PERSONNEL**

by

Richard J. Greenhoe

March 2005

Thesis Advisors:

Kathryn Kocher  
George W. Thomas

**Approved for public release; distribution unlimited**

THIS PAGE INTENTIONALLY LEFT BLANK

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188
<p>Public reporting burden for this collection of information is estimated to average 1 hour per response, including the time for reviewing instruction, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington, VA 22202-4302, and to the Office of Management and Budget, Paperwork Reduction Project (0704-0188) Washington DC 20503.</p>			
1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE	3. REPORT TYPE AND DATES COVERED	
	March 2005	Master's Thesis	
4. TITLE AND SUBTITLE: Comparison of Retention Characteristics Over Time: Evidence from the 1992 and 1999 Department of Defense Survey of Active Duty Personnel		5. FUNDING NUMBERS	
6. AUTHOR(S) Richard J. Greenhoe II			
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Naval Postgraduate School Monterey, CA 93943-5000		8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING /MONITORING AGENCY NAME(S) AND ADDRESS(ES) N/A		10. SPONSORING/MONITORING AGENCY REPORT NUMBER	
<p><b>11. SUPPLEMENTARY NOTES</b> The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.</p>			
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.		12b. DISTRIBUTION CODE	
<p><b>13. ABSTRACT</b>  This thesis compares characteristics that influence intended stay/leave behavior of non prior service junior naval officers from two different time periods. Samples of officers, under the rank of lieutenant, with less than six years of active duty service from the 1992 and 1999 Department of Defense Surveys of Active Duty Personnel were used for this analysis. Metrics for important determinates of retention were constructed using similar questions from both surveys. Logistic regression was used to identify significant influences on retention intentions in both survey years.</p> <p>Two composite dimensions positively affected retention intentions in both survey years: satisfaction with Service Attributes and satisfaction with Present Employment Attributes. Being female negatively affected retention intentions in both surveys. The minority variable, Black, the number of PCS moves, and having debt greater than \$7,500 positively affected retention intentions, while being stationed onboard a ship, probability of finding a civilian job, and the composite dimension, satisfaction with Future Employment Attributes, negatively affected retention intentions in 1992. Influence from a significant other and the number of hours worked positively affected retention in 1999.</p> <p>Monetary variables were highly significant for retention intentions in 1992 but not in 1999. It is likely that the force drawdown, base closures, and a weak economy in 1992 explain these differences.</p>			
14. SUBJECT TERMS Navy, officer, retention, females.		<b>15. NUMBER OF PAGES</b> 135	
<b>16. PRICE CODE</b>			
17. SECURITY CLASSIFICATION OF REPORT Unclassified	18. SECURITY CLASSIFICATION OF THIS PAGE Unclassified	19. SECURITY CLASSIFICATION OF ABSTRACT Unclassified	20. LIMITATION OF ABSTRACT UL

NSN 7540-01-280-5500

Standard Form 298 (Rev. 2-89)  
Prescribed by ANSI Std. Z39-18

THIS PAGE INTENTIONALLY LEFT BLANK

**Approved for public release; distribution is unlimited**

**COMPARISON OF RETENTION CHARACTERISTICS OVER TIME: EVIDENCE  
FROM THE 1992 AND 1999 DEPARTMENT OF DEFENSE SURVEY OF  
ACTIVE DUTY PERSONNEL**

Richard J. Greenhoe  
Lieutenant, United States Navy  
B.S., Pennsylvania State University, 1999

Submitted in partial fulfillment of the  
requirements for the degree of

**MASTER OF BUSINESS ADMINISTRATION**

from the

**NAVAL POSTGRADUATE SCHOOL**  
**March 2005**

Author: Richard J. Greenhoe

Approved by: Kathryn Kocher  
Thesis Advisor

George W. Thomas  
Thesis Advisor

Douglas A. Brook, Ph.D.  
Dean, Graduate School of Business and  
Public Policy

THIS PAGE INTENTIONALLY LEFT BLANK

## **ABSTRACT**

This thesis compares characteristics that influence intended stay/leave behavior of non prior service junior naval officers from two different time periods. Samples of officers, under the rank of lieutenant, with less than six years of active duty service from the 1992 and 1999 Department of Defense Surveys of Active Duty Personnel were used for this analysis. Metrics for important determinates of retention were constructed using similar questions from both surveys. Logistic regression was used to identify significant influences on retention intentions in both survey years.

Two composite dimensions positively affected retention intentions in both survey years: satisfaction with Service Attributes and satisfaction with Present Employment Attributes. Being female negatively affected retention intentions in both surveys. The minority variable, Black, the number of PCS moves, and having debt greater than \$7,500 positively affected retention intentions, while being stationed onboard a ship, probability of finding a civilian job, and the composite dimension, satisfaction with Future Employment Attributes, negatively affected retention intentions in 1992. Influence from a significant other and the number of hours worked positively affected retention in 1999.

Monetary variables were highly significant for retention intentions in 1992 but not in 1999. It is likely that the force drawdown, base closures, and a weak economy in 1992 explain these differences.

THIS PAGE INTENTIONALLY LEFT BLANK

## TABLE OF CONTENTS

I.	INTRODUCTION .....	1
A.	BACKGROUND .....	1
B.	PURPOSE .....	3
II.	LITERATURE REVIEW .....	7
A.	TURNOVER THEORY .....	7
1.	Voluntary Separations by Employee .....	7
2.	Involuntary Separation of Employee .....	8
B.	CIVILIAN TURNOVER AND RETENTION RESEARCH .....	9
C.	MILITARY TURNOVER AND RETENTION RESEARCH .....	15
D.	1992 DOD ARMED FORCES SURVEY RESEARCH .....	22
E.	1999 DOD ARMED FORCES SURVEY RESEARCH .....	24
F.	SUMMARY .....	26
III.	DATA, MODEL DEVELOPMENT AND METHODOLOGY .....	29
A.	INTRODUCTION .....	29
B.	DATA .....	29
1.	1992 Data Set .....	29
2.	1999 Data Set .....	31
C.	DATA LIMITATIONS .....	32
D.	DESCRIPTION OF THE SAMPLES .....	32
1.	Retention .....	34
E.	EXPLANATORY VARIABLES .....	37
1.	Description .....	37
2.	Variable Construction .....	40
a.	Demographic Variables .....	40
b.	External Attribute .....	43
c.	Military Attributes .....	44
d.	Financial Variables .....	46
e.	Factor Analysis .....	48
F.	METHODOLOGY .....	49
1.	Logistic Regression .....	49
2.	Model Specification .....	50
3.	Hypothesized Effects of Explanatory Variables .....	50
IV.	MODEL RESULTS .....	61
A.	RESULTS .....	61
B.	1992 LOGISTIC REGRESSION RESULTS .....	62
1.	Final Model .....	62
2.	Chow Test .....	62
3.	Response Profile .....	63
4.	Model Fit Statistics .....	63

5.	Global Null Hypothesis Test .....	64
6.	R-Square .....	65
7.	Classification Table .....	65
8.	Interpretation of Coefficients .....	66
	a. <i>Gender</i> .....	68
	b. <i>Family Status</i> .....	68
	c. <i>Race</i> .....	69
	d. <i>Rank</i> .....	69
	e. <i>Workweek</i> .....	70
	f. <i>Ship/Shore</i> .....	70
	g. <i>PCS</i> .....	71
	h. <i>INFLUENCE</i> .....	71
	i. <i>PROBJOB</i> .....	71
	j. <i>FINANCIAL</i> .....	72
	k. <i>Debt</i> .....	72
	l. <i>Service Attributes</i> .....	73
	m. <i>Future Employment Attributes</i> .....	73
	n. <i>Present Employment Attributes</i> .....	74
9.	1992 Partial Effects .....	74
C.	1999 LOGISTIC REGRESSION RESULTS .....	78
1.	Final Model .....	78
2.	Chow Test .....	79
3.	Response Profile .....	79
4.	Model Fit Statistics .....	80
5.	Global Null Hypothesis Test .....	80
6.	R-Square .....	81
7.	Classification Table .....	81
8.	Interpretation of Coefficients .....	82
	a. <i>Gender</i> .....	83
	b. <i>Family Status</i> .....	84
	c. <i>Race</i> .....	85
	d. <i>Rank</i> .....	86
	e. <i>Workweek</i> .....	87
	f. <i>SHIP</i> .....	88
	g. <i>PCS</i> .....	88
	h. <i>INFLUENCE</i> .....	88
	i. <i>PROBJOB</i> .....	88
	j. <i>FINANCIAL</i> .....	88
	k. <i>DEBT Variables</i> .....	89
	l. <i>Service Attributes</i> .....	89
	m. <i>Future Employment Attributes</i> .....	90
	n. <i>Present Employment Attributes</i> .....	90
9.	1999 Partial Effects .....	91
D.	DIFFERENCES AND SIMILARITIES BETWEEN THE 1992 MODEL AND THE 1999 MODEL .....	93

1.	Differences Between the 1992 Model and the 1999 Model .....	93
a.	<i>Race</i> .....	94
b.	<i>Rank</i> .....	95
c.	<i>PCS</i> .....	95
d.	<i>FINANCIAL</i> .....	96
e.	<i>Debt</i> .....	96
f.	<i>Future Employment Attribute</i> .....	97
g.	<i>INFLUENCE</i> .....	97
h.	<i>SHIP</i> .....	98
i.	<i>Workweek</i> .....	99
j.	<i>PROBJOB</i> .....	100
2.	Similarities Between the 1992 Model and the 1999 Model .....	100
a.	<i>Service Attributes</i> .....	101
b.	<i>FEMALE</i> .....	101
c.	<i>Present Employment Attributes</i> .....	102
d.	<i>Family Status</i> .....	103
V.	CONCLUSIONS AND RECOMMENDATIONS .....	105
A.	CONCLUSIONS .....	106
B.	POLICY IMPLICATIONS .....	110
C.	FUTURE RESEARCH .....	111
	LIST OF REFERENCES .....	115
	INITIAL DISTRIBUTION LIST .....	119

## LIST OF TABLES

Table 1. Categorization of Correlates .....	9
Table 2. Frequency distribution of the Dependent Variable, STAY, for the 1992 Data Set .....	34
Table 3. Frequency distribution of the Dependent Variable, STAY, for the 1999 Data Set .....	34
Table 4. Expected Years of Service, 1992 Survey .....	36
Table 5. Expected Years of Service, 1999 Survey .....	37
Table 6. Dependent Variable, STAY .....	37
Table 7. Explanatory Variables .....	38
Table 8. Factor Analysis of Satisfaction Variables .....	49
Table 9. Hypothesized Effect on the Dependent Variable STAY .....	59
Table 10. 1992 Chow Test .....	62
Table 11. 1992 Response Profile .....	63
Table 12. 1992 Model Fit Statistics .....	64
Table 13. Global Null Hypothesis Test for STAY Model .....	64
Table 14. 1992 R-Square .....	65
Table 15. 1992 Classification Table .....	66
Table 16. 1992 Logistic Regression Parameter Estimates .....	67
Table 17. Joint Significance Test for SNC, SWC, and MNC .....	69
Table 18. Joint Significance Test for HISPANIC and BLACK .....	69
Table 19. Joint Significance of Workweek .....	70
Table 20. Joint Significance Test for Debt Variable and FINANCIAL Variable .....	73
Table 21. 1992 Partial Effect .....	76
Table 22. 1999 Chow Test .....	79
Table 23. 1999 Response Profile .....	79
Table 24. 1999 Model Fit Statistics .....	80
Table 25. Global Null Hypothesis Test for STAY .....	80
Table 26. 1999 R-Square .....	81
Table 27. 1999 Classification Table .....	81
Table 28. 1999 Logistic Regression Parameter Estimates .....	82
Table 29. Joint Significance of SNC, SWC, and MNC .....	85
Table 30. Joint Test for HISPANIC and BLACK .....	86
Table 31. Joint Significant Test of LTJG and LT .....	86
Table 32. Joint Significant Test of Workweek Variables .....	87
Table 33. Joint Significance Test for Debt Variables .....	89
Table 34. Joint Significance Test for Debt Variable and FINANCIAL Variable .....	89
Table 35. 1999 Partial Effect .....	92
Table 36. Differences in the Race Variables .....	95
Table 37. Differences in the Rank Variables .....	95
Table 38. Differences in the PCS Variables .....	96
Table 39. Differences in the FINANCIAL Variables .....	96

Table 40. Differences in the Debt Variables .....	97
Table 41. Differences in the Future Employment Attribute variable .....	97
Table 42. Differences in the INFLUENCE Variables .....	98
Table 43. Differences in the SHIP Variables .....	99
Table 44. Differences in the Workweek Variables .....	100
Table 45. Differences in the PROBJOB Variable .....	100
Table 46. Similarities in the Composite Dimension Variable, Service Attributes .....	101
Table 47. Similarities in the Female Variables .....	102
Table 48. Similarities in the Present Employment Attributes Variables .....	103
Table 49. Family Status Variables .....	103

THIS PAGE INTENTIONALLY LEFT BLANK

## **ACKNOWLEDGMENTS**

I would like to thank Professor Kathy Kocher for her guidance, support, and patience during this thesis process. She has been a sincere inspiration and a true mentor during my time here. I will forever be indebted to her.

In addition, I would like to thank Professor George Thomas for his insight, encouragement, and aid during this thesis process.

Lastly, I would like to thank my loving wife and beautiful daughter for their patience and support during our time at Naval Post Graduate School.

THIS PAGE INTENTIONALLY LEFT BLANK

## I. INTRODUCTION

### A. BACKGROUND

The officer personnel assignment process is a major part of the United States Navy's personnel distribution system. It ensures war fighters and supporting activities receive the right sailor with the right training in the right billet at the right time (R4). Furthermore, it is a critical element in meeting the challenges of Seapower 21 and Global CONOPS. Currently, in accordance with Seapower 21, the Chief of Naval Operations (CNO), ADM Vern Clark, has stated the emphasis on sailors as the number one priority.

Manpower is, and will remain, our Navy's biggest challenge. We are at war for people and we are fighting this war on three fronts – recruiting the right people, raising retention and attacking attrition. [Ref. 4]

Furthermore, the CNO points out that Taking care of our sailors, through leadership from junior to senior personnel, will greatly influence sailors and considerably increase retention. Additionally, through these efforts we will win this "war" for people.

To win, we need the involvement of every leader at every level, from admirals to third class petty officers and seamen – everyone who has Sailors working for them. All of you directly affect our success on this issue, through your own personal actions and through your chain of command. [Ref. 4]

Furthermore,

Sailors at the end of their second term have acquired tremendous skills and are more in demand in the marketplace than they were the day

they came into the Navy. We are at war for this talent. [Ref. 4]

The "career Sailor", or Sailors who remain on active duty beyond their initial obligation are a tremendous asset to the United States Navy. As noted in the quotation from the CNO, Sailors who have acquired skills inherent to the Navy are valuable assets in the civilian sector. In order to keep these Sailors in the military, incentives must be high. Although there are a few characteristics of military life such as camaraderie, and national service that are non-monetary incentives, there are many more monetary factors such as military-civilian pay ratio, a robust economy and civilian opportunities that often draw our most talented Sailors out of the military. In today's society, where the economy is thriving, unemployment rates are decreasing, and more young adults are heading to college, the number of qualified recruits is diminishing, forcing the Navy to rely on a more career oriented and older force. In a broad sense, relying on a career force will help reduce the cost of the military by decreasing turnover expenses, training cost and shortfalls in critical specialties. However, in order to keep a mature career force, the United States Navy must invest highly in recruiting career Sailors, and then keeping them in the Navy. Retention is a key to increased readiness, and the United States Navy needs to be able to harvest their investment in personnel.

A major hurdle facing Senior Naval leaders is how to retain sailors without offering large sums of money as they have in the past. Pecuniary efforts in the past have been effective, but regrettably the Military Personnel Navy (MPN) account, which provides funding for all basic

personnel pay, has steadily increased over the past few years which contradict the CNO's priorities of decreasing cost and reinvesting in its efficiencies. Furthermore, with the decrease in end strength, and retention rates continuously increasing, the Navy's ability to reinvest and continue to "hoard" its investment in human capital is not proving to be effective.

#### **B. PURPOSE**

The goal of this research is to compare particular attributes that are associated with retention from data collected in the 1992 *Department of Defense Survey of Active Duty Personnel* and the 1999 *Department of Defense Survey of Active Duty Personnel*. In particular, the focus is on identifying the characteristics that determine the likelihood that junior naval officers, ensign through lieutenant, will intend to remain on active duty past their initial obligation. A junior officer incurs an initial obligation for four to seven years depending on his or her occupation. Unlike enlisted Sailors, officers have a choice to remain on active duty without the obligation of another contract with the exception of those who agree to some type of bonus or postgraduate education.

The purpose of this thesis is to identify non-monetary influences on retention that are consistent with both data sets, in the hope of producing recommendations to the Department of Defense to reduce personnel cost and help increase retention. Although the two time periods differ in many circumstances such as the thriving economy of 1999 and the draw down periods of the early 1990's, there are non-pecuniary factors that are consistent through both time periods. In this author's view, camaraderie and national

service considerably increase retention. Furthermore, service members returning from the Gulf War in 1991 and early 1992 were recognized as heroes and dignitaries of peace. However, with the uncertainty of a draw down approaching in 1992 many service members faced retention decisions after years of dedication and devotion to the United States Military. The draw down of the early 1990's targeted career Sailors, "thinning out" the more expensive and older service members, leaving a more junior, inexperienced, and less expensive military in its place. However, as the economy of the late 1990's boomed and the military-civilian pay ratio decreased, career Sailors were enticed to leave the Navy in hope of gaining economic stability in the civilian sector. Once again career Sailors were leaving the service in greater numbers than expected.

Although the time periods were inherently different, the mass exit of career sailors in both periods causes great concern about how to retain career Sailors. While some personnel turnover is expected in the military, controlling cost is the number one priority of the CNO, and in order to control cost, the Navy must retain Sailors and reduce attrition by means other than pecuniary incentives.

Regression analysis is used to help identify non-monetary and monetary variables of importance in explaining retention intentions and answer the following research questions:

1. What characteristics influence a service member's intentions to remain or leave active duty based on a comparative analysis of the 1992 and 1999 Department of Defense Armed Services Survey?

2. Based on the comparative analysis, how can the Department of Defense influence intention characteristics to ensure desirable sailors remain on active duty?

With a better understanding of both, lawmakers and senior naval officers will be able to balance the troops and take advantage of cost saving methods.

THIS PAGE INTENTIONALLY LEFT BLANK

## II. LITERATURE REVIEW

### A. TURNOVER THEORY

Turnover can be thought of as the number of people, items, or goods, that have passed into and out off a place or business. According to Price, it's "the degree of individual movement across the membership boundary of a social system." [Ref 31] What determines turnover varies from occupation to occupation. Furthermore, it varies among race, sex and age groups. There are many explanations for the decisions of employees to leave an organization. Likewise, there are many reasons why an employer may terminate an employee. Although turnover itself is not necessarily a negative consequence, a significant result of turnover is the cost of hiring and training new employees experienced by the organization.

For the individual and the firm, there are both pecuniary and non-pecuniary benefits of voluntary or involuntary termination.

#### **1. Voluntary Separations by Employee**

Employees who leave their current employers do so for many reasons such as obtaining higher paying, more beneficial and better job matches or for greater opportunities to grow and increase personal worth. However, possible negative consequences for the employee include the loss of benefits and seniority, disruption of the family if forced to relocate, and the stress of searching for a new job or adapting to a new career.

For the Employer, the cost and benefit will be potentially higher if the employee leaving is a key figure in the organization. The hardship faced by the

organization during the loss of manpower may be detrimental to efficiency and the day-to-day operations if the individual loss was a key player. The recruiting cost will be higher to fill senior positions and the potential loss of knowledge and abilities of the individual may be non-quantifiable. However, there is potential for growth by the company with the entrance of new employees, bringing needed enthusiasm, motivation and innovation.

## **2. Involuntary Separation of Employee**

Involuntary separation of the employee brings greater concerns to the employee. The individual will then be forced to search for new employment when he or she is not ready to do so. Furthermore, the hardship brought to the individual may bring further unnecessary hardship to the family such as loss of income, relocation for new job, and loss of benefits.

Conversely, involuntary separation may have some benefits for the employee as well. He or she may now be able to search for, and find a "better-fit" job, relocate closer to family, or return to school to increase educational benefits. Furthermore, he or she may find opportunities not readily available in his or her previous employment.

For the employer, the benefit of an involuntary separation of an employee may be lower than for a voluntary separation. While the separation may be best for organization, the cost of recruiting and training is still incurred by the employer. Furthermore, the employee may have been a vital member to a particular branch or team of the organization. However, the potential benefits of

increased innovation, motivation and enthusiasm of new employees may eventually outweigh the hiring cost incurred.

#### **B. CIVILIAN TURNOVER AND RETENTION RESEARCH**

In an article written by John L. Cotton and Jeffrey M. Tuttle, meta-analyses was used to confirm many conclusions made in earlier qualitative reviews concerning employee retention. [Ref 5] Their analysis determined that age, tenure, overall job satisfaction, employment perceptions, and many other variables are correlated with employee turnover. However, they also concluded that task receptiveness, accession rates and intelligence are not highly correlated with employee retention. They used Pettman's [Ref 30] categorization of correlates to categorize each variable within three categories: external correlates; work-related correlates; and personal correlates. The following table indicates their findings and the direction and relative significance of the influence each variable has on retention. [Ref 5]

**Table 1. Categorization of Correlates**

<b>EXTERNAL CORRELATES</b>	<b>SIGNIFICANCE</b>	<b>RELATIONSHIP TO RETENTION</b>
Employment perceptions	P < .0005	Positive
Unemployment rate	P <.01	Negative
Accession rate	Weak	Positive
Union presence	P <.0005	Negative
<b>WORK-RELATED CORRELATES</b>		
Pay	P <.0005	Negative
Job performance	P <.0005	Negative
Role clarity	P <.0005	Negative

Task repetitiveness	P < .02	Positive
Overall job satisfaction	P < .0005	Negative
Satisfaction with pay	P < .0005	Negative
Satisfaction with work	P < .0005	Negative
Satisfaction with supervision	P < .0005	Negative
Satisfaction with coworkers	P < .0005	Negative
Satisfaction with promotional opportunities	P < .0005	Negative
Organizational commitment	P < .0005	Negative

#### **PERSONAL CORRELATES**

Age	P < .0005	Negative
Tenure	P < .0005	Negative
Gender	P < .005	Negative (Men)
Biographical information	P < .0005	Unknown
Education	P < .0005	Positive
Marital Status	P < .01	Negative (Men)
Number of dependents	P < .0005	Negative
Aptitude and Ability	P < .003	Unknown
Intelligence	P < .10	Positive
Behavioral intentions	P < .0005	Positive
Met expectations	P < .0005	Negative

---

Source: After Cotton and Tuttle (1986), p. 61.

However, Cotton and Tuttle's conclusions contradict other research conducted on employee turnover by Price (1977). Price finds that task receptiveness is a key variable in determining an individual's willingness to

provide labor. If individuals are not willing to accept what is offered, they most likely will not offer their services. In addition, research has also shown that an individual's willingness to defer further responsibilities within an organization, or lack of ambition to excel beyond standard benchmarks, will eventually result in the likelihood of them being involuntarily separated according to Cotton and Price. [Ref 5]

In 1977, an article written by William H. Mobley, discussed the relationship between job satisfaction and the withdrawal decision. Job satisfaction is a key influence in the turnover process, particularly if an employee is not satisfied with his or her current job or employer. However, Mobley points out that satisfaction is only linked to turnover, and may not necessarily lead to the end result of employee turnover. He argues that the period between experienced dissatisfaction and termination has several steps, and that normally employees weigh several options before termination. For instance, if an individual is thinking about looking for another job, then he or she is only considering quitting. However, if an individual is actively looking for employment outside of his or her current organization, then he or she has moved beyond considering quitting. However, if that individual can not find another employer, or if the economy is weak, then that individual may be faced with reconsidering the desire to quit and be forced to reevaluate his or her current position.

The processes of determining the greater utility yield is what ultimately determines stay/quit behavior. If the utility yield is greater for seeking out other

alternatives, then the individual will seek new employment. Conversely, if the utility yield is lower for seeking other employment, then the individual will not seek other employment. The utility is based on current employment, benefits such as seniority and the cost associated with transferring from one job to another. Unfortunately, if an individual can not find employment alternatives, or the utility of quitting is lower than for staying, then this may lead to other forms of withdrawal, such as absenteeism and passive job behavior. [Ref 24] Additionally, when an employee is considering quitting, other factors play into his or her decision such as seniority, family, cost (opportunity and monetary) and loss of vested benefits. Mobley concludes that the steps between job dissatisfaction and quitting are not the same for all, and only in a few instances do individuals impulsively quit. The relationship between job dissatisfaction and quitting is weak according to Mobley.

In 1979, Mobley and associates continued work in this area, extending his previous work. They proposed that job satisfaction, expected utility of present job, and expected utility of alternatives are the key factors in quit/stay behavior. [Ref 25]

In 1998, Ann P Bartel and Nachum Sicherman published "Technological Change and the Skill Acquisition of Young Workers" in the Journal of Labor Economics. [Ref 2] Bartel and Sicherman showed that, in general, the complementarity between training and schooling dominates the substitutability of previously acquired skills. If employees' previously acquired skills become obsolete because of high rates of technological change, then workers

and employers have an incentive to invest in training to match the specific requirements of the new technology. Alternatively, if the more educated workers are able to adapt faster to technological change, then the substitutability between schooling and training will dominate. Their findings showed that education is highly correlated with employee turnover. Their argument was simply that the more educated, or better trained an employee is, the more likely he or she is to remain with a company. Additionally, the more education (post formal) a company contributes to the employee, the more likely they are to "hoard" that employee for future use. [Ref 15] In essence, education is character strength of an individual and the corporation, but the character strength will only be beneficial if the corporation employs that employee.

According to John L. Cotton and Jeffrey M. Tuttle, employee turnover depends on many more factors relating to the organization such as size, strength, and type of organization. [Ref 5] Because organizations differ, trying to compare one organization to another may be like comparing apples to oranges. Furthermore, early findings, such as Price's report in 1977 "The study of turnover", cover an era in time much different than that of today. [Ref 31] For instance, Price reported that unions did not influence employee turnover, while Cotton and Tuttle argue otherwise.

Although Tuttle and Cotton argue that the size of the company and the perception of the company to those outside the organization play a particularly important role in determining job satisfaction, a particular trait that is not easily captured is the willingness of an individual to

provide his or her services. Organizations, such as the military, have employees that have strong ties to the core values of their organization. These employees generally show a unique commitment to the organization compared with employees who work at factory jobs or low paying jobs. Furthermore, Cotton and Tuttle also reported that the employee population being studied affects the relationship between employee turnover and pay, as well as satisfaction with the work, and gender.

Economic factors also play a role in determining employee turnover. Economic factors are used as a metric for employees to determine if there is perhaps a chance to find a better, higher paying, job elsewhere. Additionally, national economic data are consistently related to aggregate turnover. Rosa Fernandez points out that employee turnover is high during periods of low unemployment. [Ref 10] Conversely, during periods of high unemployment, employee turnover is lower, and more individuals choose alternate responses to unemployment such as returning to college to enhance their job opportunities in future years.

Personal commitment to the organization plays a particularly large role in retention. Cotton and Tuttle emphasize factors concerning the organization, however, no matter how well-respected the organization, personal commitment to the organization also influences intention. Michael Jenkins states "job-satisfaction determines commitment to some extent", however; individual self-monitoring influences an individual's commitment to the organization. Organizational commitment is "measured as an attitudinal identification with a particular organization" according to Jenkins. [Ref 17] If the social psychological

construct of self-monitoring is high in an individual, then commitment is highly correlated with job-satisfaction. However, if self-monitoring is low, then job-satisfaction is not highly correlated with commitment and those individuals who are leavers are less committed. Therefore, individuals who are not satisfied with their jobs, and not committed to their organization, or have the motivation or desire to increase their self-worth, will have higher turnover rates.

#### **C. MILITARY TURNOVER AND RETENTION RESEARCH**

A unique aspect of the military is that when a service member puts on a uniform, this action affects more than just that individual, it also affects every relationship that individual has. Deployment cycles lead to long separations from family and friends. These long term separations hinder relationships between husbands and wives, fathers and mothers, and their children. Furthermore, as service members are constantly transferred from ship to ship or shore assignment to shore assignment, spouses are faced with interruptions in their careers, children are faced with the hardships of losing friends and the anxiety of having to create new relationships. [Ref 17]

Mobility is a characteristic often sought by civilian corporations because it allows companies to transfer their employees without incurring the additional cost of hiring and training. Ehrenberg and Smith (2000) determined personnel characteristics influence migration and that migration is higher among young and better educated people. In addition, mobility allows employees to migrate to enhance job opportunities and personnel growth. However, unlike the military where it is a requirement, this is an option for civilian employees. Additionally, service

members incur long hours of work, often over weekends, without extra compensation in pay. Although these extrinsic factors relating to military service are not characteristics of all military occupations, unlike the civilian sector, they are often dominant during a service member's career.

Another influence on retention is tenure. Although it is not as important as some other factors when predicated retention, tenure is highly correlated with retention in the civilian sector. Johnston [Ref 18] and Mackin et al. [Ref 22] concluded that tenure, or years of service, influenced retention behavior. Their findings showed that the longer an individual remains with a corporation, the more likely he or she is to remain long-term with that corporation. Likewise, in the armed forces, the longer a service member serves on active duty, the more likely they are to remain on active duty. [Ref 18]

Organizations that have lower employee turnover have, in general, higher salaries and retirement plans. In addition, they generally have some type of incentive, or bonus, for continued service. Since early 2000, bonuses have played a particularly important role in retention for junior Navy officers. Prior to the Surface Warfare Officer Continuation Pay and the Surface Warfare Officer Critical Skills Bonus (2003), bonuses in the general officer corps were not prominent with the exception of Aviation Incentive pay and Nuclear Officers Incentive pay. Nakada (1996) revealed that pay had a positive effect on retention. Ashcraft (1987) also emphasized the importance of pay as a predictor in retention, although the 'pay' variable was not significant, it did provide an insight into how pay is

perceived by military members in the short-term (positive) and long-term (negative) models. [Ref 1]]

Ashcraft (1987) used the 1985 Department of Defense Survey to analyze retention for junior officers. He used two models to identify short-term and long-term factors that influence retention. He concluded that the probability of finding a good civilian job had a negative effect on retention in both the long and short run. Furthermore, extrinsic job factors such as pay and allowances, current military job, job training/in-service education, and working/environment conditions also were statistically significant in their effects on retention. When military servicemembers experience a decrease in satisfaction with extrinsic factors, they are less likely to remain on active duty. Ashcroft also concluded that dissatisfaction with family factors such as assignment stability, family environment, number of PCS moves, medical care and commissary services were significant only in his long-term model. These variables had a significant negative effect on retention, showing that if a servicemember was dissatisfied with any of the variables then he or she was less likely to remain on active duty. Lastly, he also concluded that sea duty had a significant negative effect on retention. Junior service members with high sea service rates were less likely to remain on active duty. He also noted that sea service and length of service (LOS) were correlated and that when LOS increased, sea service also increased. Because of the correlation, it is safe to say that senior service members tend to have high sea service rates due to longevity in the service. Furthermore, because of a higher LOS, they are more likely to remain on

active duty and that the effect of sea service on retention decreases as a sailor's LOS increases.

Additionally, Nadaka et al (1996) showed through research on Nuclear Officer Incentive Pay that bonuses for extended service increase retention. Furthermore, Nadaka et al revealed that incentives such as bonuses play a particularly strong role in retention. Their study showed that the Surface Warfare Incentive Program (SWOCP) increased retention by nearly 15%. [Ref 26]

Having dependents was overwhelmingly the strongest predictor of retention identified in several military retention studies. Ashcroft [Ref 1], Clemens [Ref 3], Gencer [Ref 12], Hosek [Ref 16], Kastner [Ref 19], and Warren and Goldberg [Ref 34] all concluded that service members who are married or have dependents are more likely to remain on active duty. This is true in both the civilian sector and the military for several reasons such as the importance to families of medical and dental benefits, retirement benefits and job stability. Nevertheless, other factors such as long deployments, frequent transfers, and instability in family life also inherently lead service members to relinquish their ties with the United States Military. [Ref 3] [Ref 16][Ref 19] [Ref 36]

Kirby (1998) compared a three year retention model to an 18 month model (Grissmer, Kirby, and Sze, 1992) created from the 1985 Department of Defense Survey for Officers and Enlisted Personnel using reservists personnel. Although this model captures mostly characteristics relating to the mobilization of reservists, it did support previous retention models regarding pay and family environment.

Unlike active duty personnel, reservists are only mobilized during time of need to support military operations. However, the effect of pay and family separations are the same for an active duty servicemember as they are for a reservist. Using the three year model, the main factors affecting retention among reservists were: paygrade, component, satisfaction with reserves, and attitude of spouse toward reserve duty. All of these factors are comparable to factors affecting active duty personnel. Paygrades (rank) are the same for active duty servicemembers as they are for reservist. Furthermore, influence from a spouse can greatly affect a servicemember's decision to remain on active duty or leave. Their findings mirror their 18 month model and are congruent with those of other military retention models.

Hosek et al (2001) studied female attrition and concluded that the three broad issues that explain why female officers are less likely to remain on active duty than male officers are: concentration in certain occupational specialties, lack of consensus among servicemembers on the role of women in the military, and competing family obligations. Of these three, competing family obligations appeared to be the largest determinant for females to leave military service. According to Hosek et al, "women officers face considerably different competing obligations from family responsibilities than do men." [Ref 16] Furthermore, they found female Officers are more likely to have spouses. They also remarked that female Officers who have military spouses diminish the opportunity for both servicemembers to pursuit an aggressive career. Because of this, one of the

servicemembers will enter into a career-boosting job while the other will face a possible career ending job. Hosek et al also stated that adding children to this equation will increase the possibility that one of the servicemembers will possibly have to sacrifice a career in the military, and according to their study it will most likely be the female Officer.

Hosek et al also added the stability of the family as a major determinant of retention among female Officers. Because frequent reassessments are highly encouraged to obtain jobs that enhance advancement, spouses (male or female) incur interruptions in career development. Although this interruption could be felt by either the male or female Officer, their study found "that the burden is more common for female Officers than male Officers." [Ref 16] In the Hosek study, it was determined that one-quarter of the female Officers in their study were affected by career interruption while only 15 percent of the men experienced the same effect. To limit career interruptions, married servicemembers may choose to live apart geographically. This gives both Officers the option of relocating to accompany his or her spouse, or to live as a geographical bachelor. Although the study pointed out that female Officers are more likely to be geo-bachelors than men, the reason for this is that female Officers are more likely to be married to a male Officer.

Hosek et al also added that the limitation of career fields has had an impact on the advancement of female Officers. Before the 1993-1994 policy change<sup>1</sup> that allowed

---

<sup>1</sup> Defense Authorization Act of 1994 allowed women to serve on combat ships and fly combat aircraft.

females to enter career fields that are inherently dangerous, but not in direct combat, females were limited to very few jobs that were career advancing. According to the Hosek et al study, Officers interviewed felt that noncombat occupations limited career progression to ranks beyond O-5. Before the policy change, female Officers were limited to noncombat occupations. Since then, female officers now serve onboard ships in combat zones, and fly aircraft in combat zones.

Hosek et al also stated other explanations for lower female advancement rates are:

- Sexual harassment creates an uncomfortable working environment for women who are harassed.
- Male officers' fears of being charged with sexual harassment have placed a pall on interactions between men and women.
- The demands of assignments often come into conflict with family responsibilities, sometimes unnecessarily.
- There continues to be no clear consensus among military personnel on the appropriate role for women in the military.

Furthermore, many female Officers felt that inherent skills and abilities played a large role on advancement. Prior to 1994, male Officers dominated combat and combat-supporting roles. Unanimously, the female Officers included in the Hosek study stated that during certain points of their career they have had to "prove themselves" to be as capable, if not more capable, than their male counterparts. Likewise, they suggested that the military perceives the softer (physically weaker) female would not be as effective of a leader as her male counterpart. Since this study consisted of focus groups and surveys, there was no real evidence to support how the skills and abilities effected

advancement differently. However, Mehay (1995) found that Navy female Officers are more likely to receive early recommendations for promotion on fitness reports than male Officers. Likewise, Cymrot and Lawler found female Surface Warfare Officers were more likely to obtain qualifications faster than male Officers. Furthermore, North et al (1995) and Mehay (1995) found that females are promoted at higher rates than males.

#### **D. 1992 DOD ARMED FORCES SURVEY RESEARCH**

Since the end of the Cold War and the subsequent downsizing (specifically 1992), the United States Military has undergone considerable changes. [Ref 11] Since 1992, Congress has enacted extensive pay raises and specific bonuses targeted at maintaining retention and hence, military readiness. To determine the effect of these initiatives and policy changes, the Department of Defense fields periodic surveys to military servicemembers to evaluate how policy changes are affecting both the servicemembers and their families. Much of the 1992 survey was based on family matters such as family separation, affect of war and the probability of being separated from the military during the force drawdown.

Kastner (1997) conducted an analysis using the 1992 Department of Defense survey and divided the data into three groups: married male officers, single male officers and female officers. There were commonalities among all three groups in predicting retention. STABILITY<sup>2</sup> was a predominant influence on retention for all three groups. If an individual was concerned about long-term satiability due to force drawdown in the military, he or she would be

---

<sup>2</sup> Measures an individuals concern about his or her long-term opportunities in the military.

more likely to become a careerist. Furthermore, those with dependents and those who were married were also more likely to remain on active duty.

For male officers (single and married), factor analysis was used to construct a composite dimension variable, EXTRINSIC, which consisted of satisfaction relating to job security, promotion opportunity, retirement benefits, pay and job training, and which was a statistically significant positive influence on retention. Another variable based on factor analysis, INTRINSIC, consisted of satisfaction variables relating to coworkers, acquaintances, current job, work conditions, personal freedom, and job assignments and was also a statistically significant positive influence on retention. However, for females, intrinsic and extrinsic factors were not significant, but sea duty had a significant negative effect on retention. Kastner's results were similar to previous retention research, however, he did identify a difference in retention motivation between male (both single and married), and female officers and emphasized the value of using different models for men and women. [Ref 19]

Zinner (1997) also used the 1992 Department of Defense survey to conduct analysis addressing retention behaviors of junior Marine officers. He restricted his model to 692 male marines, 01 through 03, with more than one year but less than seven years of active duty. Furthermore, he limited his sample to those that had occupational specialties, eliminating officers who were beyond one year of service, but had not finished initial training and he also omitted those Marines with specialties outside of the normal duties, such as lawyers. He divided his candidate

explanatory variables into three categories, in keeping with work correlates defined by Pettman's (1973) categorization of correlates. Furthermore, he included three additional variables for job satisfaction constructor using factor analysis, including intrinsic job satisfiers, extrinsic job satisfiers and advancement opportunities. In addition to these factors, he included force reduction variables by using principal components to simplify the description of a set of interrelated variables reflecting employment concerns and personal concerns. He concluded that the following variables are statistically significant in determining retention: type of commissioning program, certain occupational specialties specifically ground support (air), not deployed during Persian Gulf War or area of operation, intrinsic job satisfiers, and force drawdown employment concerns. Although his results reflect many of the expected outcomes based on literature reviewed, an unexpected variable that was not significant was the extrinsic variable that captures satisfaction with job attributes such as pay, promotion and benefits. Further investigation determined that a majority of the Marines in the sample were satisfied with pay, leading to little variation with in the extrinsic variable. Additionally, tenure (years of service) was not statistically significant, despite its importance in the literature. [Ref 36]

#### **E. 1999 DOD ARMED FORCES SURVEY RESEARCH**

The Department of Defense fielded another in their series of periodic surveys to evaluate military servicemembers' concerns and attitudes towards their

military experience in 1999. The results of their latest survey were released in March of 2000.

The 1999 survey was administered to a random sample of approximately 66,000 personnel from all four branches of the armed services and the Coast Guard. Of those, approximately 32,000 respondents provided preliminary data for research. Their survey results indicated that 50 percent of active duty military personnel were satisfied with their way of life, and that satisfaction increased with seniority. Of the 50 percent that were satisfied, 73 percent reported that they were likely to stay in the military. Furthermore, pay and job enjoyment were cited as top reasons for both intending to stay and considering leaving [Ref 11]. Separation from family and little personal time were cited as reasons to leave, and in general, most military personnel believe that they would be better compensated, and have more personal and family time available in the civilian world [Ref 11]. In addition, more than half of the personnel surveyed (53 percent) felt they were financially secure; however, 22 percent reported insufficient pay had forced them to use government assistance such as food stamps and Women, Infant, and Children (WIC) programs. [Ref 11]

Gencer (2002) conducted a study using the 1999 Department of Defense Armed Forces Survey using a subset of male Army officers. He noted that an officer of the rank of captain in the Army is less likely to remain on active duty than a first or second lieutenant. Furthermore, the longer the officer's initial expected career had been prior to entering the service, such as service until retirement, the more likely he or she was to remain on active duty past

his or initial obligation. Additionally, a solider who was married with dependents was also more likely to remain on active duty, *ceteris paribus*. He also conducted a factor analysis and included four factors in his regression. The factors identified were: satisfaction with military intrinsic values; satisfaction with Military Career advancement opportunities; Satisfaction with Military Job Deployment and Economic Life; and Satisfaction with Military Health Service. The first three factors were significant at the .01 level while factor four was not significant. His results and predictions were similar to those of previous research conducted on military retention.

[Ref 12]

Clemens (2002) also used the 1999 Department of Defense Armed Forces Survey to conduct an analysis of the retention plans of junior naval officers. The variables he found to be statistically significant in predicting retention were: Rank, Military Occupation, Family Status (Married with dependents), Life expectations, and two of four factors. These factors represented satisfaction with military work values (factor 1) and satisfaction with military allocation of time (factor 2). Factor 1 consisted of satisfaction with job enjoyment, leadership, training, assignment and morale variables. Factor 2 consisted of satisfaction with personal time, workload, other duty requirements, deployment, manning levels and education variables. [Ref 3]

#### **F. SUMMARY**

A retention decision is based on an individual's preferences, and preferences differ among individuals. Research has pinpointed key monetary variables that affect

retention, such as pay. However, it is important to remember the role that non-pecuniary job characteristics, such as devotion to duty and honor received when serving ones country play in influencing retention. This thesis is designed to take a closer look at demographic characteristics, such as family status, and intrinsic job attributes such as devotion to duty, and satisfaction with current job, and determine how they influence retention.

THIS PAGE INTENTIONALLY LEFT BLANK

### **III. DATA, MODEL DEVELOPMENT AND METHODOLOGY**

#### **A. INTRODUCTION**

This chapter describes the data and samples used in this statistical analysis and it explains how the dependent and independent variables were defined based on the 1992 and 1999 survey questions. This chapter also provides simple descriptive statistics and includes a preliminary analysis to help identify interesting information about factors influencing retention.

#### **B. DATA**

The data used in this study are from the 1992 and 1999 Department of Defense Armed Forces surveys. The Active Duty Survey (ADS) is sponsored by the Office of Assistant Secretary of Defense (AOSD) for Force Management Policy. The ADS survey has been conducted every seven years since 1978, with the most recent occurring in 1999. The surveys are used to study aspects of military life such as: effects of war on families, effects of separation and deployment on families, military couples, and how attitudes toward military life change over time. Each survey is designed to address the policies and events that are of current interest to the Department of Defense and the servicemembers. The 1992 survey focused on areas concerning deployment, war, and family separation. The 1999 survey focused on issues relating to family, pay and lifestyle.

##### **1. 1992 Data Set**

One of the data sets used for this research paper was collected from the Department of Defense 1992 Survey of Active Duty Personnel. The population consisted of all

active-duty Army, Navy, Marine Corp, Air Force and Coast Guard members, including Reservists on active duty, below the rank of Admiral or General, who had served at least 6 months of service at the time of survey. [Ref 7]

The sample frame for the 1992 survey included only those members who were on active duty in 1992. The initial sample consisted of a non-proportional stratified, single stage random sample of 97,000 Active Duty individuals, of who approximately 60,000 returned surveys that were determined to be eligible for use. [Ref 7] The survey was designed to aid in examining retention decisions, career orientation, and policies affecting military members and their families. The sample is stratified by branch, gender, pay grade, marital status, and race/ethnic group characteristics. The 138-question survey was divided into ten categories: Military background, present and past locations, reenlistment/career intent, individual and family characteristics, dependents, military compensation, member civilian labor force/volunteer experience, spouse labor force experience, family resources and military life.

Each question in the 1992 survey was named for further use with numeric and alphabetical identifiers. The first letter signifies the status of survey respondents, with "M" used to indicate a servicemember respondent. For example, for the variable M122123, the "M" represents servicemember, the first three digits, 122, indicate the enlisted survey question numbered 122 and the last three digits, 123, represent the officer survey question number.

## **2. 1999 Data Set**

The second data set used for this research paper was collected from the Department of Defense 1999 Survey of Active Duty Personnel. The sample frame for the 1999 survey included only those members who were on active duty in May 1999, with eligibility conditional on also being on active duty in September 1999. The initial sample consisted of a non-proportional stratified, single stage random sample of 66,040 individuals. Of these individuals, 63,250 were determined to be eligible members of the target population, and had returned surveys with useful information. [Ref 11] The sample design considered requirements for analyses by service, marital status, pay grade, occupation, gender, and location. [Ref 11] The 112-question survey was divided into 7 categories: assignment information, career information, military life, programs and services, family information, economic issues, and background.

Each question in the 1999 survey was coded for further use with numeric and alphabetical identifiers. The first letter, "M", "SR" or "PR", signifies the name of study and status of the respondent: "M" was used for servicemember, "SR" was used to distinguish survey-reported information from DMDC-provided information, and "PR" was used to distinguish spouse characteristics. For example, the name of the variable M9945 can be interpreted as: M represents the servicemember, the first two digits, 99, are the last two digits of the survey year, and 45 indicates the survey questionnaire item it relates to. Some of the variables were recoded for confidentiality and further diagnostic research.

### **C. DATA LIMITATIONS**

A significant difference between the two survey samples is that the 1992 survey was also administered to some dependents of members of the Armed services; however, those responses were not used in this study. Another substantial difference is that the 1992 survey greatly over-represented the female population in the Armed services. Nearly 50 percent of the respondents were female, while the actual 1992 active female component of the officer corps was 12.3 percent. [Ref 28] In contrast, the 1999 survey female response was close to the actual representation. The number of female respondents was approximately 15 percent, while the actual female component of the officer corps was 14.7 percent. [Ref 29] In addition, the 1999 survey eliminated a substantial number of responses to specific questionnaire items for confidentiality. Because some combinations of variables may be used to identify individual sailors (such as black, female, lieutenant, married, pilot, has a child, deployed), only non confidential data were released to the public for research.

### **D. DESCRIPTION OF THE SAMPLES**

Traditionally, junior officers in the United States Navy are considered Lieutenant Commanders and below. However, some communities, such as the Surface Warfare community, consider Lieutenant Commanders not be junior because of their position. Furthermore, officers are normally promoted to Lieutenant Commander around their tenth year of service, which is beyond their initial obligation and the time frame of interest for this research. For this reason, Lieutenants and below are used

and the data for this survey were restricted to junior officers, Ensign (O1) through Lieutenant (O3) with less than 6 years of service.

The emphasis for this research is to capture the attitudes of officers within their initial obligation. The initial obligations for officers in the United States Navy differ between occupational groups. Surface Warfare Officers have a four year commitment, Submariners have a five year commitment, and Pilots have a seven year commitment. For this research, the six year mark was selected as the primary cutoff for length of service in order to capture both junior Navy flight officers preparing to finish their initial obligation, and surface warfare officers or submariners just finishing their initial obligation. Furthermore, the data were limited to those with six years of active duty or less to remove prior-enlisted officers from the data set. Including junior officers with prior-enlisted service time could cause inconsistencies within the data set. Age, number of deployments, number of permanent change of station (PCS) moves, etc. will all be relatively larger for prior service officers compared to non prior service first term officers.

These restrictions limited the 1992 results to 2,263 initial observations and the 1999 results to 1,179 initial observations. The 1999 results had many observations eliminated due to confidentiality concerns as explained earlier. Fortunately, there were enough remaining observations so that both data sets could be used in this study to examine the differences in retention characteristics between the two survey years.

### **1. Retention**

There are several factors that determine the likelihood of a person remaining with their current employment. For this study, the variable STAY is identified as the dependent variable. STAY is defined as equaling one for a junior officer who intends to remain on active duty until he or she is eligible to retire at twenty years of service, or intends to remain on active duty beyond twenty years. Otherwise, STAY is equal to zero. Table 2 and Table 3 show the frequency and percent of those who intended to leave and stay from both data sets. The stay/leave frequencies are not an indication of intent to stay or leave for Navy Officers in 1992 and 1999, but rather, they depict the number of servicemembers in the two stratified samples that meet the criteria that define the variable STAY.

**Table 2. Frequency distribution of the Dependent Variable, STAY, for the 1992 Data Set**

Ordered Value	Intent	Total Frequency	Percent
0	Leave	1424	62.95
1	Stay	838	37.05

Source: Author

**Table 3. Frequency distribution of the Dependent Variable, STAY, for the 1999 Data Set**

Ordered Value	Intent	Total Frequency	Percent
0	Leave	1002	86.90
1	Stay	151	13.10

Source: Author

The dependent variable, STAY, was determined using the survey question "When you finally leave the military, how many total years of service do you expect to have?" Although both surveys asked the same question, the responses were recorded differently, and ultimately the variable was constructed by considering who intend to remain on active duty beyond 17 years as stayers.

Seventeen years of planned service was chosen as the cutoff for the intended service to retirement. As shown in Table 4, the response choices for the question about intended service were multiyear categories rather than individual years, as they were for the comparable question in the 1992 survey. This did not present a problem since the 1992 survey responses contained only 1 observation for 17 years, and no observations for 18 or for 19 years.

**Table 4. Expected Years of Service, 1992 Survey**

Years of Service	Expected Ultimate Years of Service			
	Frequency	Percent	Cumulative Frequency	Cumulative Percent
0	77	3.4	77	3.40
2	2	0.09	79	3.49
3	50	2.21	129	5.70
4	196	8.66	325	14.37
5	221	9.77	546	24.14
6	196	8.66	742	32.80
7	162	7.16	904	39.96
8	173	7.16	1077	47.61
9	97	4.29	1174	51.90
10	177	7.82	1351	59.73
11	21	0.93	1372	60.65
12	27	1.19	1399	61.85
13	7	0.31	1406	62.16
14	8	0.35	1414	62.51
15	7	0.31	1421	62.82
16	3	0.13	1424	62.95
17	1	0.04	1425	63.00
20	620	27.41	2045	90.41
21	1	0.04	2046	90.45
22	19	0.84	2065	91.29
23	3	0.13	2068	91.42
24	23	1.02	2091	92.44
25	66	2.92	2157	95.36
26	10	0.44	2167	95.80
28	5	0.22	2172	96.02
30	84	3.71	2256	99.73
35	4	0.18	2260	99.61
37	1	0.04	2261	99.96
40	1	0.04	2262	100.00

Source: Author

**Table 5. Expected Years of Service, 1999 Survey**

<b>Expected Ultimate Years of Service</b>				
Years of Service	Frequency	Percent	Cumulative Frequency	Cumulative Percent
4 or less	58	8.45	58	8.45
5-6	160	23.32	218	31.78
7-10	261	38.05	479	69.83
11-14	50	7.29	529	77.11
15-16	6	0.87	535	77.99
17-20	92	13.41	627	91.40
21-25	42	6.12	669	97.52
26-30	13	1.90	682	99.42
31 or more	4	0.58	686	100.00

Source: Author

Table 6 identifies the dichotomous dependent variable STAY. STAY is defined as an indication that a sailor intends to remain on active duty until eligible for retirement, which for the purpose of this research is 17 or more years of military service.

**Table 6. Dependent Variable, STAY**

Variable Description	Variable Name	Variable Type	Range
Retention 20 years or more	STAY	Binary	=1 if greater than 17. =0 otherwise

Source: Author.

## **E. EXPLANATORY VARIABLES**

### **1. Description**

a. Candidate variables for determining the likelihood to stay to retirement for active duty naval officers in the pay grades ranging from ensign to lieutenant include: pay, job enjoyment, race, gender, family status, external influences by family, debt, and the

average hours of work per week. These were selected based on turnover research for the civilian sector. Although this is a robust list of variables, there are still more potential influences for military personnel to leave their current occupation. Since most employee turnover research is focused on the civilian sector, other factors specific to the military that are not captured in the list above include deployment cycles, whether a person is attached to a ship or shore station, the number of times a person has moved during his or her career, rank, and satisfaction relating to military life style. The following table illustrates each independent variable, its frequency and percent distribution or its mean value for the 1992 and 1999 survey data.

**Table 7. Explanatory Variables**

<b>Variable</b>	<b>1992</b>		<b>1999</b>	
<u>Marital Status</u>	Freq	Pct.	Freq	Pct.
Single	16	0.71	4	0.34
W/Child				
Single No Child	1236	56.64	853	72.35
Married W/Child	281	12.42	59	5.00
Married No Child	650	28.74	255	21.63
Married-Female	449	19.85	47	3.99
Influence	937	48.26	100	8.51
<hr/>				
<u>Race/Age/Sex</u>	Freq	Pct.	Freq	Pct.
Male	1070	47.30	994	84.31
Female	1192	52.70	185	15.69
Hispanic	66	2.92	58	4.95
Black	130	5.75	89	7.95
White/Other	2066	91.35	1025	87.46
Age	Mean	25.90	Mean	25.42

---

<u>Finance</u>	Freq	Pct.	Freq	Pct.
Debt				
Debt7500	1214	53.67	955	81.00
Debt15000	599	26.48	100	8.48
DebtGRT15000	449	19.85	124	10.52
Financially-Set	*Mean	3.53	*Mean	4.08

---

<u>Military</u>	Freq	Pct.	Freq	Pct.
<u>Characteristics</u>				
Ensign	539	23.83	324	27.84
Lieutenant	724	32.01	430	36.47
Junior Grade				
Lieutenant	999	44.16	425	36.05
PROBJOB	1511	68.40	1050	89.06
Ship	502	22.57	307	26.15
<u>Workweek</u>				
HoursLess60	1697	75.02	919	77.95
Hours60to80	373	16.49	191	16.20
Hours80More	192	8.49	69	5.85
PCS Move	**Mean	3.34	**Mean	3.87

---

<u>Variable</u>	1992 and 1999 Data Combined
<u>Satisfaction with</u>	***Mean
Service Attributes	
Training	3.51
Job Enjoyment	3.46
Country Service	4.24
Future Attributes	
Job Security	3.67
Advancement	3.57
Present Attributes	
Retirement Benefits	3.22
Base Pay	3.39
PCS Moves	3.24
Free Time	3.25

---

Source: Author

\* Mean based on scale of one to five with five equal to very satisfied.

\*\* Mean based on number of moves from one through ten.

\*\*\* Mean based on scale of one to five with five equal to very satisfied.

## **2. Variable Construction**

### **a. Demographic Variables**

Demographic variables were selected based on private sector turnover research and the literature review of military retention studies. Furthermore, they were limited to those characteristics available in both data sets. Check alignment all the way through

(1) Marital Status (SNC/SWC/MNC/MWC). The 1992 data set used a code, HCC1, that determined household content. There were six possible responses:

- HCC1 = 1 if Unmarried, no dependents
- HCC1 = 2 if Unmarried with dependents
- HCC1 = 3 if Married to military spouse, no dependents
- HCC1 = 4 if Married to military spouse, with dependents
- HCC1 = 5 if Married to civilian spouse, no dependents
- HCC1 = 6 if Married to civilian spouse, with dependents

These were recoded to depict family status as follows:

- If HCC1 = 1, then FAMSTAT 1; Single, no dependents (SNC).
- If HCC1 = 2, then FAMSTAT 2; Single with dependents (SWC).
- If HCC1 = 3 and HCC1 = 5, then FAMSTAT 3; Married, no dependents (MNC).
- If HCC1 = 4 and HCC1 = 6, then FAMSTAT 4; Married with dependents (WMC).

The 1999 family status variable was constructed using two questions from the 1999 survey. The first asked whether or not the respondent was married and the second asked if the servicemember had at least one child. The questionnaire response for married was coded as equal to 1 if the servicemember was married, otherwise

married equaled 0. The questionnaire response for child was coded as equal to 1 if servicemember had at least one child, otherwise child equaled 0. The 1999 family status variable was restructured as:

- SNC = married\*child, where married =0 and child=0
- SWC = married\*child, where married =0 and child=1
- MNC = married\*child, where married =1 and child=0
- MWC = married\*child, where married =1 and child=1

For this study, married with at least one child (MWC) was used as the base case.

(2) Race (Black/Hispanic/White(Other)).

Another significant challenge in comparing the 1992 and 1999 data is the differing structure of the race/ethnic group variable. The 1992 race variable was initially constructed as:

- American Indian/Alaskan Native
- Black/Negro/African-American
- Oriental/Asian
- White/Caucasian
- Other
- Separate question was used to determine Hispanic origin

The 1999 data subdivided race and ethnic group by:

- Hispanic
- Not Hispanic, white
- Not Hispanic, Black or African American
- Not Hispanic, all other races

In order to compare the two data sets for this study, the race variable was recoded as:

- Hispanic
- Black
- White (Other)

The base case for this research is White (other).

(3) Gender (Male/Female). The male and female variables were created using similar questions from both the 1992 survey and the 1999 survey. Respondents were asked if they were male or female, and responses were coded as:

- male = 1
- female = 2

The gender variable was recoded as male = 1 and female = 0 for this study, and male was used as base case.

(4) INFLUENCE. The INFLUENCE variable was created to compare similar questions with different responses. Both survey questions related to the same idea of influence from others on a Sailor's decision to remain on active duty. However, the response choices for the surveys were different. Since influence is particularly important to a servicemember's decision to remain on active duty, it was important to create a new variable from the existing questionnaire responses to capture this effect.

The 1992 survey asked "How much influence does your spouse have on your decision to stay in the military" (M030028). The response was coded as:

- 1 = Does not apply
- 2 = A good deal of influence
- 3 = A little influence
- 4 = No Influence

This influence variable was recoded as a binary variable where influence equaled one if M030028 = 2 or M030028 = 3, otherwise influence equaled zero.

The 1999 survey asked "Does your spouse, girlfriend, or boyfriend think you should stay or leave active duty" and was recoded as M9934.

1 = Strongly favors staying  
2 = Somewhat favors staying  
3 = Has no opinion  
4 = Somewhat favors leaving  
5 = Strongly favors leaving

The influence variable was created as a binary variable where influence equaled one if m9934 = 1 or m9934 = 2, otherwise influence equaled zero. The base case for this study is "does not have influence" or INFLUENCE = 0.

***b. External Attribute***

The external attribute identified among the survey questionnaire items was the probability of finding a good job upon leaving the military.

(1) PROBJOB. A question about the probability of finding a good job upon leaving the military was asked in both surveys. The 1992 survey asked "If you were to leave the service and tried to find a civilian job, how likely would you be to find a good civilian job?" The question was recoded as M113114 and the possible responses were as follow:

1 = No chance  
2 = Very slight possibility  
3 = Slight possibility  
4 = Some possibility  
5 = Fair Possibility  
6 = Fairly good possibility  
7 = good possibility  
8 = Probable  
9 = Very Probable  
10 = Almost Sure  
11 = Certain

The PROBJOB variable was then constructed as a binary variable where Probability of finding a good job,

or PROBJOB, equaled one if M113114 was equal to or greater than 7, otherwise PROBJOB equaled zero.

1999 Survey asked how much do you agree or disagree with the following question. "It would be easy for me to get a good civilian job if I left the Military now" and recorded as M9945F with these possible responses:

- 1 = Strongly agree
- 2 = Agree
- 3 = Neither agree nor disagree
- 4 = Disagree
- 5 = Strongly Disagree

The PROBJOB variable was then constructed as a binary variable where Probability of finding a good job, or PROBJOB, equaled one if M9945F was equal to 1 or 2, otherwise PROBJOB equaled zero.

The base case for this study is a low probability of finding a job in the civilian sector, or PROBJOB = 0.

### **c. Military Attributes**

The variables representing military attributes selected from the data set are rank, average hours of work per week, whether the participant was assigned to a ship or shore assignment, and number of PCS moves. These variables were created using similar survey questions asked in both surveys.

(1) Rank (LT/LTJG/ENS). Both surveys had responses for O1 (Ensign) through O5 (Commander), and O6 (Captains) and above but did not account for officers with prior-enlisted service. Only junior officers with less than six years of service were used for this study. This insured that not only were those selected within their initial obligation, but also that there were no prior

enlisted officers included in the study. The variable was created as:

- 01 equal to Ensign
- 02 equal to Lieutenant Junior Grade
- 03 equal to Lieutenant

Ensign was used as base case for this study.

(2) Ship (SHIP/SHORE). Both the 1992 and 1999 surveys asked if members were currently assigned to a ship or to shore duty. This variable was recoded as SHIP equal to one if the member was currently assigned to a ship, otherwise SHIP equaled zero. Shore duty was used as the base case.

(3) Workweek (HOURS60LESS/HOURS60TO80/HOURS80MORE). Both surveys asked participants "on average, how many hours a week do you work?" The following were possible responses from each survey:

1992 responses:

1 = 40 hours or less  
2 = 41 - 50 hours  
3 = 51 - 60 hours  
4 = 61 - 70 hours  
5 = 71 - 80 hours  
6 = 81 hours or more

1999 responses:

1 = 40 hours or less  
2 = 41 - 50 hours  
3 = 51 - 60 hours  
4 = 61 - 80 hours  
5 = 81 hours or more

In order to compare the two data sets, the 1992 responses were recoded to match the 1999 data. Responses 1 thru 3 remained the same; however, for 1999, responses 4 and 5 were combined as 61 to 80 hours of work.

The workweek was then divided into three categories; less than 60 hours a week, 60 to 80 hours a week, and 80 hours or more a week. The base case for the model is 60 hours or less (HOURS60LESS).

(4) PCS. The permanent change of station (PCS) variable represents the number of moves a service member has made in his or her career. The PCS variable is a continuous variable. The 1992 survey had responses ranging from 1 time to more than 10 times with an average of 3.34 times while the 1999 survey had responses ranging from 1 to 7 times with an average of 3.87.

#### **d. Financial Variables**

The financial variables were created using debt collected through the career of a Sailor, and how the service member felt about his or her current financial situation.

(1) Debt (DEBT7500LESS/DEBT15000/DEBTGRTR15000). The debt variable was divided into three categories; Debt less than \$7,500, debt between \$7,500 and \$15,000 and debt greater than \$15,000. Both surveys asked "what is the accumulated debt of you and your spouse?" Both surveys allowed for an open-ended response where participants' answers ranged from \$100 dollars to approximately \$100,000 for both surveys. The base case is debt less than \$7,500 (DEBT7500LESS), with debt between \$7,500 (DEBT15000) and \$15,000 and debt greater than \$15,000 (DEBTGRTR15000) used as explanatory variables in the model.

(2) Financial. Both Surveys asked similar questions regarding financial stability. The 1992 survey asked "Overall how do you feel about you/your family income" and the variable M125126 was coded with the following responses:

1 = Very Satisfied  
2 = Satisfied  
3 = Neither  
4 = Dissatisfied  
5 = Very Dissatisfied

This variable was recoded so that "very dissatisfied" equaled 1 and "very satisfied" equaled 5:

1 = Very Dissatisfied  
2 = Dissatisfied  
3 = Neither  
4 = Satisfied  
5 = Very Satisfied

The variable M125126 was named FINANCIAL. The average for this variable in the 1992 survey was 3.53.

The 1999 survey asked "Which of the following best describes the financial condition of you and your spouse" and the variable M9995 was recoded as follows:

1 = Very Comfortable  
2 = Able to make ends meet without much difficulty  
3 = occasionally have some difficulty  
4 = Tough to make ends meet  
5 = in over your head

This variable was recoded so that "in over your head" equaled 1 and "very comfortable" equaled 5.

1 = in over your head  
2 = Tough to make ends meet  
3 = occasionally have some difficulty  
4 = Able to make ends meet without much difficulty  
5 = Very Comfortable

The variable M9995 was recoded as FINANCIAL. The average for this variable in the 1999 survey was 4.08.

Although the possible responses to the survey questions were different, they were interpreted similarly, with "Very Comfortable" expressing the same opinion as "very satisfied", and "in over your head" the same as "very dissatisfied".

### e. Factor Analysis

Factor analysis was conducted using the 1992 and 1999 observations consolidated. There were nine original satisfaction variables common to both surveys representing different aspects of satisfaction with military life collected from a similar question in both surveys: Below is a list of issues associated with the military way of life. The original response choices were:

1 = very satisfied  
2 = satisfied  
3 = neither  
4 = dissatisfied  
5 = very dissatisfied

The responses were recoded as:

1 = very dissatisfied  
2 = dissatisfied  
3 = neither  
4 = satisfied  
5 = very satisfied

Nine factor principal components were then extracted using common factor analysis (CFA) and the factor matrix was rotated to yield a more meaningful and interpretable solution. [Ref 33] The factors are simultaneously rotated to have as many zero loadings on each factor as possible and then the variables were loaded onto three new variables representing three separate dimensions; Service Attributes, Future Attributes and Present Attributes. Common factor analysis was used to account for inter-correlations among the observed variables and to identify the hidden dimensions that explain why these variables are correlated with each other. CFA is commonly used with survey questionnaire responses relating to satisfaction or to attitudes. Table 8 shows the factor loading of the composite dimension variables.

**Table 8. Factor Analysis of Satisfaction Variables**

Composite Dimension	Factor Loading			
	F1	F2	F3	Communality
Satisfaction with Military Service				
Job Enjoyment	.8128	.0936	.1428	.2619
Training	.5092	.3977	.1319	.2888
Country service	.3144	.1499	.1429	.5100
Satisfaction with Future Employment				
Job Security	.0529	.6562	.1712	.4349
Advancement	.2694	.6275	.2089	.3574
Satisfaction with Present Employment				
Retirement Benefits	.0525	.2746	.4589	.6899
Basic Pay	.1418	.1972	.4505	.2293
PCS Moves	.1478	.0912	.4463	.4627
Free Time	.4187	.0637	.4218	.1417
Variance explained by each factor	1.314	1.140	.9219	3.377

Note: Extraction of factors by principal iterated factors with varimax rotation. Level of satisfaction with items reported as: 1=very dissatisfied; 2=dissatisfied; 3=neither; 4=satisfied; 5=very satisfied.

Source: Author.

Each variable predominantly loaded on a single factor with the exception of free time which loaded about equally on factor 1 and factor 2. This variable could have been removed from the factor analysis, but it was retained because its relationship to both dimensions was intuitive.

## **F. METHODOLOGY**

### **1. Logistic Regression**

Logistic Regression was chosen as the method of analysis for this study because the dependent variable is a binary variable where planning to remain until retirement,

or 'stay', is equal to 1 and planning to leave active duty before retirement is equal to 0. The probability of a junior officer remaining on active duty is as follows:

$P(\text{Stay}) = \frac{1}{1+e^{-(B_0 X_0 + B_1 X_1 + \dots + B_k X_k)}}$  where  $B_i$  is the value of the estimated parameter,  $X_i$  is the value of the explanatory variable, and  $k$  is the number of explanatory variables for each individual.

## 2. Model Specification

The theoretical model was developed from the literature review and from the author's personal experience.

STAY = F(FEMALE, MARRIEDFEMALE, SNC, SWC, MNC, HISPANIC BLACK, LTJG, LT, HOURS60TO80, HOURS80MORE, SHIP, PCS, INFLUENCE, PROBJOB, FINANCIAL, DEBT15000, DEBTGRTR15000 SERVICEATTRIBUTES, FUTUREATTRIBUTES, PRESENTATTRIBUTES).

## 3. Hypothesized Effects of Explanatory Variables

a. the following is a list of the independent variables and their hypothesized effects on the dependent variable, STAY.

(1) Family status. Family status is defined by four binary variables: single without children, single with children, married without children, and married with children (base case). Children, according to literature review have a positive impact on retention decisions because of the desire for family stability and medical benefits. Research by Price [Ref 31] also predicted that individuals who have dependents are more likely to remain loyal to their current employment. Therefore, those service members who are married with children are expected to be the most likely to remain on active duty and this group was selected as the base case. Single Sailors with no children are expected to be less likely to remain on active

duty than the base case because of their lack of parental obligation or concerns about long periods of separation from dependents, and their ability to migrate. Single Sailors with children are expected to be less likely to remain on active duty than the base case because of parental obligation and concerns about long periods of separation from dependents. Lastly, Sailors who are married without children are expected to be less likely to remain on active duty than the base case because of the relative ease of migration, their lack of parental obligation, and more limited concern for stability.

(2) Gender. It is hypothesized that females will be less likely to remain on active duty than the base case, male, because of factors listed in the Hosek (2001) study:

- concentration in certain occupational specialties
- lack of consensus among service members on the role of women in the military
- competing family obligations.

Of these variables, competing family obligations seems to influence leave decisions more than the other two factors listed. Females feel more pressure (from spouses and/or children) than do male servicemembers to leave the military because of family obligation. [Ref 16] Also, because of recent changes to the combat exclusion policy for women, access to occupational specialties that have a higher advancement rate has just recently opened up. However, at the time of the 1999 survey there were very few females in these occupations. For the 1992 survey, there were no females in these occupations and therefore it is expected that females will be less likely to remain on active duty than males in both models.

(3) Race/ethnic. Race/ethnic group differences are investigated using three groups: Hispanic, Black and White (Other) which is the base case. Traditionally, unemployment rates have been higher for minorities, thus, it is believed that the minority variables will have a positive effect on STAY relative to the base case based on literature review.

(4) Influence. The variable that captures the influence of others on the individual Sailor is anticipated to have a positive effect on retention. Influence plays a large role in determining the likelihood of a person staying with his or her current employer. If employees have outside influences, other stakeholders, and if the influence is positive, then he or she is more likely to remain with his or her current employer. It is hypothesized that if the influence is negative, then this will add additional reasons for Sailors to leave the.

(5) Rank. Rank is described by three cases: the base case is Ensign, the remaining two categories are Lieutenant and Lieutenant Junior Grade. It is hypothesized that both Lieutenant Junior and Lieutenant will have a positive effect on retention compared to the base case, Ensign. Rank can almost be compared to job tenure in the civilian sector. The further along one is in his or her career with an organization, the more likely he or she is to remain with that organization. Likewise, as an officer is promoted, or gains tenure, it is expected that he or she is more likely to remain on active duty.

(6) Probability of good civilian job. If a Sailor feels that the possibility of finding a rewarding job, or a better job, in the civilian sector is good, then

the probability of him or her remaining on active duty is likely to be low. It is hypothesized that the probability of a good civilian job (PROBJOB) will have a negative effect on planned intentions.

(7) Ship vs. shore duty. Sea Duty can be arduous, but rewarding. Many junior officers remain on active duty after sea duty to get reacquainted with family, or recuperate and prepare for their next assignment at sea, or prepare for leaving the military if they decide to do so. However, leavers tend to leave the Navy as soon as the obligation onboard their present command is finished. Therefore, it is expected that an officer stationed on shore duty will be more likely to remain on active duty than an officer stationed onboard a ship.

(8) PCS. Many junior officers become accustomed to moving every few years. An inherent characteristic of military service is the rotation between duty stations. Most officers move, or PCS, approximately 2 to 3 times within their first initial obligation. However, if junior officers experience a greater frequency of moves, then this is expected to have a greater negative effect on likelihood to stay. It is hypothesized that a Sailor with a higher number of PCS moves, will be less likely to remain on active duty than a Sailor who experiences fewer PCS moves.

(9) Workweek. The workweek variable is divided into three categories: Less than 60 hours a week (base case), 60 to 80 hours a week, and 80 hours or more a week. It is hypothesized that a Sailor who experiences a work week greater than 60 hours will be less likely to remain on active duty than one who works a shorter work

week. Workload is an indication of employee contentment. If an employee feels that his or her labor is being abused, then the likelihood of remaining on active duty is lower. Furthermore, Ann P. Bartel [Ref 2] and John Cotton [Ref 5] also linked workload as having a negative affect on retention if the workload is too great. Cotton also points out that repetitive work will deteriorate worker motivation, and thus, decrease the possibility of retention and effectiveness.

(10) Debt. The debt variable was divided into three categories: Less than \$7,500 of debt (base case), \$7,500 to \$15,000 in debt, and debt greater than \$15,000. It is hypothesized that Sailors with greater than \$7,500 of debt will be more likely to remain on active duty than Sailors with less than the base case. Additionally, it is hypothesized that the financially-set variable (FINANCIAL), will have a positive effect, as it indicates how satisfied an officer is with his or her total income. Being economically sound plays an important role in determining likelihood of remaining on active duty. It is hypothesized that this variable will have a positive impact on retention for two reasons. First, if an individual is not economically sound, then the chances of forgoing future employment, pay and security by relinquishing ties with his or her current employer are low. Conversely, if an individual is economically sound, the likelihood of relinquishing his or her ties with the current employer is also low. Furthermore, if an individual has no other options because of lack of mobility, or he or she can not afford to be without employment, then this should have a positive effect on retention. It is hypothesized that a

Sailor who is more satisfied with his or her financial situation will be more likely to remain on active duty than a Sailor who is less financial satisfied.

(11) Satisfaction with Service Attributes dimension. The Service Attributes dimension is composed of three satisfaction variables: Job enjoyment, Training, and pride of serving ones country. The job enjoyment variable determines whether an individual is unhappy with his or her current employment. John L Cotton and Jeffrey M. Tuttle [Ref 5] identify job satisfaction as a leading determinant in employee turnover. It is hypothesized that if an individual is satisfied with his or her current employer and that he or she enjoys his or her work, then he or she will be likely to remain with the current employer; however, if the opposite is true then the likelihood of retention will be doubtful.

Training plays an important role in retention. If a Sailor is satisfied with the training available to him or her, then it is hypothesized that this will have a positive effect on retention. Bartel and Sicherman (1998) provided evidence that education, post formal or job related, increases retention. Similarly, Royle (1980) found education to be a contributor to retention in the military. It is expected that as junior Navy officers progress through the chain-of-command, they too will receive education opportunities, job related and post formal. If an officer is satisfied with the opportunity for further education, or the type of education offered, then he or she will be more likely to remain on active duty. Thus, satisfaction with education is expected

to positively influence retention decisions of junior Navy officers.

Finally, pride in serving ones country is greatly expected to influence retention. As described earlier, an individual who is highly attached to his or her organization has a greater likelihood of remaining with the present employer. Likewise, most military members exhibit a high degree of association with their service branch. It is expected that those who have a high desire for public service will have a greater propensity to remain on active duty. Furthermore, public service in the view of the public, and public opinion, is an honorable job. Many service members serve because of traditions set by family, friends and peers. Only those who truly desire this type of occupation will volunteer to serve, and when one volunteers his or her services, or agree to work, then he or she will be more committed to his or her employer. Furthermore, as indicated by Tuttle and Cotton, job connection, or identifying with a particular organization, also creates a cohesion or bond that increases retention. Tuttle and Cotton showed that on average, an individual who is committed, or shows pride in his or her organization, is more likely to remain with that organization.

All three satisfaction variables that load on this factor are related to satisfaction with work. If an individual is satisfied with the military, then the Service Attributes dimension will have a positive effect on retention.

(12) Future Employment Attributes dimension. The satisfaction dimension, Future Employment Attributes, is composed of two variables; satisfaction with job

security and satisfaction with advancement. It is hypothesized that if an individual is satisfied with advancement opportunities, this will have a positive effect on likelihood to stay. An unfortunate attribute of the Navy officer pay scale is that all officers, with four years of active duty, are eligible for promotion to lieutenant with very few exceptions. However, if future expectations of being promoted beyond lieutenant are positive, then it is expected that promotion will have a positive effect on intentions to remain on active duty. Likewise, officers who are not satisfied with promotion opportunities are expected to be less likely to remain on active duty.

Job security plays an important role as well. If a Sailor feels that his or her job is secure, then his or her propensity to remain on active duty will be positive. Officers in the Navy are designated by warfare for unrestricted line (surface, sub-mariner, aviation), and by job type for restricted line (supply, medical). Although, most officers will generally continue to serve in a particular warfare, or job, it is possible for those jobs to experience a drawdown, such as the Surface Warfare community experienced in 2003. If a Sailor is content in his or her current occupation, and feels that he or she will be allowed to serve in that warfare community or job during his or her entire career, then he or she will more likely remain on active duty. Conversely, if a Sailor feels that his or her job is not secure, then he or she will likely look for employment elsewhere. Therefore, if a Sailor is satisfied with his or her job security, then this is expected to have a positive effect on retention.

(13) Present Employment Attributes dimension. The Present Employment Attributes dimension consists of satisfaction with retirement benefits, basic pay, free time, and PCS moves. Pay is probably the most important factor in determining the willingness of an individual to provide labor services. Both Price [Ref 31] and Cotton [Ref 5] find pay satisfaction to be highly indicative of employee retention. The military has a structured pay scale based on rank. The only other factor in determining pay is years of service; however, all individuals with the same characteristics such as years of service and rank, are paid the same base pay. It is therefore expected that, if an officer is satisfied with his or her basic pay, then the likelihood of him or her to remain on active duty is higher than an officer who is not satisfied with his or her basic pay.

Additionally, the retirement benefits associated with military retirement are highly sought after and are extremely unusual in the civilian sector. Retirement benefits transpire as soon as the Sailor retires, thus increasing pay if the Sailor becomes employed in the civilian sector. This increase in pay will likely increase his or her net worth and, in return, increase leisure time. Furthermore, if a Sailor is satisfied with future retirement benefits, and feels that it will be financially beneficial, then his or her propensity to remain on active duty is expected to be high.

Table 9 summarizes the hypothesized effects of the independent variables on the dependent variable STAY.

**Table 9. Hypothesized Effect on the Dependent Variable STAY**

Variable	Expected Sign
Single No Children (SNC)	- (With respect to Married with children)
Single With Children (SWC)	- (With respect to Married with children)
Married No Children (MNC)	- (With respect to Married with children)
Black	+ (With respect to White Other)
Hispanic	+ (With respect to White Other)
Female	- (With respect to base case Male)
Influence	+ (If Sailor has influence to stay)
Lieutenant Junior Grade	+ (With respect to base case Ensign)
Lieutenant	+ (With respect to base case Ensign)
PROBJOB	- (If probability of finding a civilian job)
Ship	- (If Sailor is stationed onboard a Naval Vessel)
Workweek	- (If greater than 60 hours)
PCS	+ (The greater the number of moves)
Debt15000	+ (with respect to base case less than \$7500)
DebtGRTR15000	+ (with respect to base case less than \$7500)
Financial	+ (If Sailor is satisfied with financial situation)
Service Attributes	+
Present Employment Attributes	+
Future Employment Attributes	+

Source: Author

THIS PAGE INTENTIONALLY LEFT BLANK

## IV. MODEL RESULTS

### A. RESULTS

This chapter presents the results of the two logistic regression models used to explain the intended retention of respondents of the 1992 and 1999 Department of Defense surveys. The purpose of this thesis is to identify variables that positively affect intended retention, particularly intrinsic variables, in one or both data sets. The models are discussed separately, and then significant findings are compared.

Logistic regression was chosen because the dependent variable, STAY, is a dichotomous variable. Logistic regression is used to predict a binary dependent variable based on a set of independent variables. Logistic regression converts the dependent variable into the log of the odds ratio in an attempt to estimate the probability of a certain event happening. Logistic regression does not assume linearity between the dependent and independent variables nor does it require normally distributed variables. For this study, two of the 20 independent variables are continuous, four are based on ordinal responses to questions about satisfaction including three composite satisfaction dimension variables, and the remaining 14 are binomial. The variables were chosen based on literature review but, not necessarily for their usefulness in prediction. In order to compare the two data sets for this study, the variables selected were limited to those questions that were available for both survey years. For that reason the predictive ability is not expected to be high for determining retention. However, the study will

be able to identify variables influencing retention that are consistent between the two survey years.

## B. 1992 LOGISTIC REGRESSION RESULTS

### 1. Final Model

The final model for 1992 had 1,998 observations. There were 285 observations deleted due to missing values for the response or explanatory variables. The model consisted of 20 independent variables of which 11 were statistically significant at the .10 level. The Max-rescaled R-Square was 0.1854, which is not large but is typical for models predicting retention.

### 2. Chow Test

A chow test was used to determine if separate models were needed for males and females. After running three separate models, one unrestricted and two restricted models, the -2 log likelihoods were used in the test. Table 10 presents the results.

**Table 10. 1992 Chow Test**

Observation	LL	P	PROB
1	37.637	0.5139	0.4861

Source: Author

With a p-value of 0.4861, the null hypothesis that the models for men and women are the same could not be rejected and it was determined that only one model is necessary for males and females. Because of this, one model will be used for both the 1992 and 1999 regressions to ensure the two models are comparable.

### **3. Response Profile**

Table 11 shows the response profile of the ordered value, frequency, and percent distribution of the dependent variable STAY.

**Table 11. 1992 Response Profile**

<b>Ordered Value</b>	<b>STAY</b>	<b>Total Frequency</b>	<b>Percent</b>
1	1	755	37.78
2	0	1243	62.22

Source: Author

It is important to remember that the table represents the stay/leave behavior of the respondents of the 1992 Department of Defense survey and not those of all individuals on active duty in 1992. For this sample, STAY was equal to 1 for 755 respondents, or 38 percent of the sample. Conversely, STAY was equal to 0 for 1,243 respondents, or 62 percent of the sample.

### **4. Model Fit Statistics**

The log-likelihood,  $-2 \text{ Log } L$ , is the likelihood of a model given the data and a set of parameters. To get the  $-2 \log L$ , the  $\log L$  is multiplied by  $-2$ . This is then used to help select models. The AIC is also used to select the best model among alternative parameters. The AIC is equal to  $-2\text{Log}L + 2(k+s)$ , where  $k$  is equal to total number of response levels minus one, and  $s$  is equal to the number of independent variables. For this model,  $-2 \text{ Log } L$  equaled 2356.995 and  $2(k+s)$  equaled  $2(1+20)$ ; therefore, the AIC is equal to 2398.995. The AIC statistic penalizes a model that has too many parameters. Therefore, the smaller the AIC, the better the model fit. Table 12 illustrates the results of the model fit statistics.

**Table 12. 1992 Model Fit Statistics**

<b>Criterion</b>	<b>Intercept only</b>	<b>Intercept and Covariates</b>
AIC	2651.411	2398.995
SC	2657.011	2516.593
-2 Log L	2649.411	2356.995

Source: Author

**5. Global Null Hypothesis Test**

The global null hypothesis tests BETA=0, or that the coefficients are equal to zero. If the significance value (p-value) is small, then the model as a whole is significant. Table 13 illustrates the test results for the Global Null Hypothesis.

**Table 13. Global Null Hypothesis Test for STAY Model**

<b>Test</b>	<b>Chi-Square</b>	<b>DF</b>	<b>Pr &gt; Chi-Square</b>
Likelihood Ratio	292.4158	20	<.0001
Score	265.8495	20	<.0001
Wald	235.7226	20	<.0001

Source: Author

The likelihood-ratio test statistic for the global null hypothesis is  $2(\log(L_1) - \log(L_0))$ .  $L_0$  is the maximized likelihood for the null model that includes only the intercept.  $L_1$  is the maximized likelihood for the full model. For this model, the likelihood ratio is equal to 2649.411 - 2356.995 or 292.4158 with a P-Value of <.0001 with 20 degrees of freedom. This indicates the model is significant and that the model with covariates is better than the model with just the intercept.

## **6. R-Square**

The R-Square is a measure of goodness of fit of the model. For this study, the model was developed using only variables that were available from two different surveys. Although the predictive power of the model is important, it is not surprising to have a low R-square since the model was restricted to only those variables available in both surveys. The following table contains the R-Square of the 1992 model.

**Table 14. 1992 R-Square**

R-Square	0.1361	Max-rescaled R-Square	0.1854
----------	--------	-----------------------	--------

Source: Author

The generalized R-square is calculated as  $1 - \exp\{-(L^2/n)\}$  where  $L^2$  is the likelihood ratio and  $n$  is the sample size.

$$R^2 = 1 - \exp\{-(292.4158/1998)\} = .1361$$

The generalized  $R^2$  has several beneficial characteristics such as:

- It's based on the quantity being maximized
- It's invariant to grouping
- It never diminishes as variables are added
- The calculated value is usually similar to the  $R^2$  obtained from fitting a linear probability model to dichotomous data by OLS

However, the generalized  $R^2$  cannot be used to determine variation in the dependent variable explained by the independent variables. The Max-rescaled R-square is used for this calculation. For this model, 18.54 percent of the variance in STAY can be explained by the independent variables used.

## **7. Classification Table**

The classification table, Table 15, shows a predicted response for each observation based on a predicted

probability. Two cut-off values are shown. The response profiles (Table 11) indicated that there were 755 observations with STAY equal to 1, or 38 percent of the sample. The classification table indicates that at the .38 probability cut-off, the model predicts 63.5 percent of the observations correctly.

**Table 15. 1992 Classification Table**

---

Classification Table									
	Correct		Incorrect			Percentage			
Prob Level	Event	Non - Event	Event	Non - Event	Correct	Sensi-tivity	Speci-ficity	False Pos	False Neg
0.38	486	783	460	269	63.5	64.4	63.0	48.6	25.6
0.50	320	1018	225	435	67.0	42.4	81.9	41.3	29.9

---

Source: Author

#### **8. Interpretation of Coefficients**

Table 16 contains the estimated regression coefficients for the 1992 model. The base case for this model is a white, male, ensign, who works less than 60 hours a week, assigned to a shore assignment, with debt less than 7,500 dollars, feels the probability of finding a good jog outside of the military is low, has the mean score of 3.53 (scale 1-5) for financial satisfaction, has the mean number of PCS moves (3.34), has no influence to STAY, and is married with dependents.

**Table 16. 1992 Logistic Regression Parameter Estimates**

Variable	Estimate	Standard Error	P-Value
<b>FEMALE***</b>	-0.3060	0.1113	0.0060
SNC(a)	0.0709	0.3112	0.4099
SWC(a)	0.3020	0.7045	0.3340
MNC(a)	-0.0776	0.1596	0.3134
HISPANIC(a)	-0.2326	0.3052	0.2230
<b>BLACK*(a)</b>	0.3029	0.3029	0.0896
LTJG	0.0970	0.1409	0.4912
LT	0.0693	0.1419	0.6253
HOURS60TO80(a)	0.1558	0.1519	0.1525
HOURS80MORE(a)	0.0969	0.2122	0.3239
<b>SHIP*</b>	-0.4441	0.1523	0.0036
<b>PCS*</b>	0.1769	0.0352	<.0001
INFLUENCE(a)	0.2567	0.2995	0.1960
<b>PROBJOB*(a)</b>	-0.1534	0.1085	0.0787
<b>FINANCIAL***</b>	-0.2576	0.0625	<.0001
<b>DEBT7500TO15000*(a)</b>	0.1668	0.1186	0.0799
<b>DEBTGRT15000*(a)</b>	0.1987	0.1348	0.0703
<b>SERVICE ATTRIBUTES***</b>	0.7692	0.0714	<.0001
<b>FUTURE ATTRIBUTES**</b>	-0.1707	0.0695	0.0141
<b>PRESENT ATTRIBUTES***</b>	0.5859	0.0906	<.0001

\* Significant at the ten percent level

\*\* Significant at the five percent level

\*\*\* Significant at the one percent level

(a) one-tailed test

---

Source: Author

Of the 20 variables selected for inclusion in the model, FEMALE, FINANCIAL, Service Attributes, and Present Employment Attributes were statistically significant at the .01 level. Future Employment Attributes was significant at the .05 level. SHIP and PCS were statistically significant at the .10 level. BLACK, PROBJOB, DEBT7500TO15000, and DEBTGTR15000 were statistically significant at the .10 level using a one-tailed test. The hypothesized effects in Table 9 are different than the actual effects for SNC, SWC, and HISPANIC but none of these are significantly different

from zero. Future Employment Attributes, however, has a negative sign while its hypothesized sign was positive and it is significant. SNC and SWC were hypothesized to be less likely to remain on active duty. Future Employment Attributes were hypothesized to have a positive effect on retention. The following paragraphs describe the significant and insignificant variables and whether the variables had the same effect on STAY as hypothesized.

**a. Gender**

FEMALE was statistically significant and had a negative effect on STAY. The negative effect supports the previous hypothesis that females are less likely than males to remain on active duty beyond their initial obligation.

**b. Family Status**

None of the family status variables were statistically significant at any level. The SWC variable had only 16 observations equal to one which was less than one percent of the total observations and was statistically insignificant. It is suspected that the low number of observations led to insignificance of the variable. The MNC variable had a p-value of .19 using a one-tailed test. With a .19 p-value and the hypothesized sign similar to the actual prediction sign, the variable MNC shows some significance in predicting STAY but is relatively weak. The SNC variable had the most observations equal to one of all of the family status variables. The SNC variable represented nearly 55 percent of the total family status observations but was also statistically insignificant. Furthermore, the family status variables were not jointly significant as depicted in Table 17.

**Table 17. Joint Significance Test for SNC, SWC, and MNC**

Label	Chi-Square	DF	Pr > ChiSq
test_exclude_SNC_SWC_MNC	0.5181	3	0.9149

Source: Author

**c. Race**

The BLACK variable was statistically significant and had a positive effect on STAY. The positive effect supports the previous hypothesis that a black officer is more likely to remain on active duty than a WHITE(OTHER) officer. BLACK was significant at the .10 level with a one-tailed test and represented 5.75 percent of the sample. The HISPANIC variable was not significant and did not support the hypothesized effect. HISPANIC made up less than 3 percent (2.92) of the total sample. This maybe a reason why the variable was insignificant and that its predicted effect was not congruent with the hypothesized effect. The HISPANIC and BLACK variables were not jointly significant as seen in Table 18.

**Table 18. Joint Significance Test for HISPANIC and BLACK**

Label	Chi-Square	DF	Pr > ChiSq
test_exclude_HISPANIC_BLACK	0.5181	3	0.9149

Source: Author

**d. Rank**

The rank variables had the hypothesized effects; however, neither LTJG nor LT was statistically significant at any of the usual levels. It is expected that perhaps a reason for the insignificance of the rank variables may be due to the force drawdown occurring during this time period. Since all ranks were affected by the drawdown, the possibility of not being able to STAY may have affected the

belief in having a choice to STAY. Furthermore, the result of the model could have been a unique characteristic of the sample. It is hard to completely explain why the result was insignificant, but many factors relating to rank such as the time period, the sample of Sailors, and the drawdown could have led to the insignificance of these variables in the model.

**e. Workweek**

The workweek variables were not significant at any level. It was hypothesized that the greater the number of hours worked over 60 hours, the less likely to STAY. Furthermore, the composite dimension variable, Service Attributes (discussed later), which consisted of satisfaction with intrinsic work aspects such as job enjoyment, was statistically significant and positive. It is hypothesized that if satisfaction with job enjoyment was high, then it would be expected that the questionnaire respondents were satisfied with work hours. The workweek variables were not jointly significant as shown in Table 19. However, it is still suspected that the greater the number of hours worked, the less likely a servicemember is to remain on active duty based on the hypothesized effect job enjoyment has on workweek but collinearity has masked the effect.

**Table 19. Joint Significance of Workweek**

Label	Chi-Square	DF	Pr > ChiSq
test_ Hours60to80_Hours80More	1.0842	2	0.5815

Source: Author

**f. Ship/Shore**

The variable SHIP was significant at the .01 level and had a negative effect on STAY. This supports the

previous hypothesis that an officer stationed onboard a ship is less likely to remain on active duty compared to an Officer stationed on shore duty.

***g. PCS***

The PCS variable was statistically significant at the .01 level of significance. It was hypothesized that the greater the number of moves, with respect to the mean score (3.34), the more likely an Officer was to STAY. The model supports the hypothesis that the more moves, the more likely an Officer is to remain on active duty.

***h. INFLUENCE***

The INFLUENCE variable was not statistically significant at any of the usual levels. It was hypothesized that the greater the influence of a family, friend or significant other, the greater the probability of STAY. With a one-tailed test, the variable had a p-value of .19. Because of the one-tailed test result and the model sign, there is some substantiation that INFLUENCE does positively influence retention. One reason for the low significance of this variable could be how survey respondents interpreted the question. The 1992 survey asked how much influence does your spouse have on your decision to stay, but does not offer a response about a possible influence to leave. Furthermore, the question limited the respondents to only spouse instead of adding family and friends.

***i. PROBJOB***

PROBJOB, probability of finding a good civilian job, was statistically significant at the .10 level using a one-tailed test. The hypothesized sign and the actual model prediction sign were the same. This supports the hypothesis that, if a servicemember expects that he or she

is able to find a good job in the civilian sector, then he or she will be less likely to remain on active duty.

**j. FINANCIAL**

The FINANCIAL variable is defined as: the servicemember feels he or she is financially comfortable. This variable was statistically significant at the .01 level but was not congruent with the hypothesized sign. The model predicts those who were more satisfied, were less likely to STAY. It was hypothesized that if a servicemember was satisfied with his or her finances, then he or she would be more likely to remain on active duty. The FINANCIAL variable had a mean of 3.53 with a standard deviation of .95 on a scale of 1 to 5 with 5 being very satisfied. The Present Employment Variable (discussed later) was positive and significant. This variable, which consisted of satisfaction with pay and retirement benefits, was correlated with the FINANCIAL variable (.44). Because of this, it appears multicollinearity may have masked the true effect of the FINANCIAL variable.

**k. Debt**

The debt variables consisted of debt of 7,500 dollars to 15,000 dollars (DEBT7500TO1500) and debt greater than 15,000 dollars (DEBTGRT15000). Both variables were statistically significant at the .10 level using a one-tailed test. Furthermore, both variables were congruent with the hypothesized sign. The positive sign and the statistical significance of both variables support the hypothesis that the greater the debt, the more likely a servicemember is to remain on active duty. Furthermore, the debt variables were jointly significant with the FINANCIAL variable, Table 20, and perhaps masked the effect of FINANCIAL.

**Table 20. Joint Significance Test for Debt Variable and FINANCIAL Variable**

Label	Chi-Square	DF	Pr > ChiSq
FINANCIAL_Debt15000_DebtGRTR15000	22.6926	3	<.0001

Source: Author

**1. Service Attributes**

The composite dimension, satisfaction with Service Attributes, included satisfaction with serving country, training, and job security. This variable was significant at the .01 level and the hypothesized sign was congruent to the actual model sign. This indicates that if a servicemember is satisfied with the composite dimension, Service Attributes, then he or she is more likely to remain on active duty. The positive effect supports the previous hypothesis that these attributes are likely to positively influence a servicemember to remain on active duty beyond his or her initial obligation.

**m. Future Employment Attributes**

The composite dimension, satisfaction with Future Employment Attributes, consisted of satisfaction with job security and advancement. Like the composite dimension Service Attributes, the Future Employment Attributes variable was also significant at the .01 level. However, the model sign and the hypothesized sign were not congruent. It was hypothesized that this variable would positively affect retention if servicemembers were satisfied with this composite dimension. Both job security and advancement had a high level of satisfaction with a mean value of 3.67 and 3.57 respectively. An interaction term was created combining the composite dimension variable, Future Employment Attributes, and the FEMALE

variable to determine if females were less concerned about future attributes creating a negative effect. The model coefficient was negative as expected, but it was insignificant with a probability value of .9567. A correlation was then run with Future Employment Attributes, SNC, SWC, MNC, MWC, BLACK, HISPANIC, and WHITE(OTHER) to determine if any of these variables were correlated. The only significant variable was SWC with a negative correlation with the Future Employment Attributes variable. Neither test revealed any clues as to why the Future Employment Attributes had a negative effect. Possibilities for the outcome could be the contribution of the force drawdown, collinearity with other variables, or unique characteristics of the respondents of the survey.

#### ***n. Present Employment Attributes***

The composite dimension, Present Employment Attributes, consisted of satisfaction with retirement benefits, basic pay, PCS moves, and free time. Like the other composite dimension, the Present Employment Attributes variable was also significant at the .01 level. Likewise, the composite variable had a positive effect on STAY. The positive effect supports the previous hypothesis that these attributes of present employment are likely to positively influence a servicemember to remain on active duty beyond his or her initial obligation.

#### **9. 1992 Partial Effects**

Table 21 shows the partial effect of each individual independent variable in the 1992 model. Since the logistic regression coefficients do not provide a direct interpretation due to the non-linearity of the model, another method for obtaining partial effects must be used. To determine a "base case", a hypothetical individual was

constructed with zeros as values for the binary variables and the mean as a value for continuous variables. The partial effect is the effect each independent variable has on a base case probability of staying when isolated and changed by one unit.

The base case for this model is a white, male, ensign, who works less than 60 hours a week, assigned to a shore assignment, with debt less than 7,500 dollars, feels the probability of finding a good jog outside of the military is low, has the mean score of 3.53 (scale 1-5) for financial satisfaction, has the mean number of PCS moves (3.34), has no influence to STAY, and is married with dependents. The base case probability for the 1992 model is .4183.

**Table 21. 1992 Partial Effect**

<b>Variable</b>	<b>Prediction</b>	<b>Partial Effect</b>
<b>Base Case</b>	<b>0.4183</b>	
<b>FEMALE***</b>	0.3462	-0.0721
SNC	0.4356	0.0174
SWC	0.4931	0.0748
MNC	0.3995	-0.0188
HISPANIC	0.3630	-0.0553
<b>BLACK*a</b>	0.4933	0.0750
LTJG	0.4421	0.0238
LT	0.4352	0.0169
HOURS60TO80	0.4566	0.0383
HOURS80MORE	0.4420	0.0238
<b>SHIP*</b>	0.1403	-0.2780
<b>PCS*</b>	0.4619	0.0436
INFLUENCE	0.4817	0.0635
<b>PROBJOB*a</b>	0.3815	-0.0368
<b>FINANCIAL***</b>	0.2757	-0.1426
DEBT7500TO15000*a	0.4593	0.0410
DEBTGRT15000*a	0.4673	0.0490
<b>SERVICE ATTRIBUTES***</b>	0.6081	0.1898
<b>FUTURE ATTRIBUTES**</b>	0.3774	-0.0409
<b>PRESENT ATTRIBUTES***</b>	0.5637	0.1454

\* Significant at the ten percent level

\*\* Significant at the five percent level

\*\*\* Significant at the one percent level

a. one-tailed test

---

Source: Author

The variable FEMALE is significant at the one percent level of significance and has a negative effect on retention. The probability of a female to STAY is .07 percentage points lower than for the base case male, ceteris paribus.

The variable BLACK is significant at the 10 percent level of significance using a one-tailed test and has a positive effect on retention. The probability of a BLACK to STAY is .08 percentage points higher than the base case WHITE(OTHER), ceteris paribus.

The variable SHIP is significant at the 10 percent level of significance and has a negative effect on STAY. The probability of STAY if stationed onboard a ship is .28 percentage points lower than the base case, stationed on shore duty, ceteris paribus.

The variable PCS is significant at the 10 percent level of significance and has a positive effect on STAY. The probability of STAY is .04 percentage points higher for an Officer with one more PCS move than the base case, ceteris paribus.

The variable PROBJOB is significant at the 10 percent level of significance using a one-tailed test and has a negative effect on STAY. The probability of STAY is .04 percentage points lower if the probability of finding a job in the civilian sector is "high" rather than "low", ceteris paribus.

The variable FINANCIAL is significant at the one percent level of significance and has a negative effect on retention. A one unit increase in the measure of the perception of being financially secure, with respect to the mean score, yields a .14 percentage point decrease in STAY, ceteris paribus.

The partial effect model shows the greater the debt the more likely a servicemember is to STAY. The variable that captures debt between 7,500 dollars and 15,000 dollars, DEBT7500to1500, is significant at the 10 percent level of significance using a one-tailed test and has a positive effect on STAY. The probability of STAY is .04 percentage points higher than the base case, debt less than 7,500 dollars, ceteris paribus. The variable that captures

debt greater than 15,000 dollars, DEBTGRT15000, is significant at the 10 percent level of significance using a one-tailed test and has a positive effect on retention. The probability of STAY is .05 percentage points higher than the base case, debt less than 7,500 dollars, if debt is greater than 15,000 dollars, ceteris paribus.

The composite dimension variable, Service Attributes, is significant at the one percent level of significance and has a positive effect on retention intentions. A one standard deviation increase from the average component score of this factor yields a .19 percentage point increase in STAY, ceteris paribus.

The composite dimension variable, Future Employment Attributes, is significant at the five percent level of significance and has a negative effect on retention intentions. A one standard deviation increase from the average component score of this factor yields a .04 percentage point decrease in STAY, ceteris paribus.

The composite dimension variable, Present Employment Attributes, is significant at the one percent level and has a positive effect on stay. A one standard deviation increase from the average component score of this factor yields a .15 percentage point increase in STAY, ceteris paribus.

## C. 1999 LOGISTIC REGRESSION RESULTS

### 1. Final Model

The final model for 1999 had 665 observations. There were 535 observations deleted due to missing values for the response or explanatory variable. The low number of observations was expected because of confidentiality issue discussed earlier. The model consisted of 20 independent

variables of which 5 were statistically significant at the .10 level. The Max-rescaled R-Square was 0.3932, which shows some success in predicting intentions. However, the model is not intended to predict intentions.

## **2. Chow Test**

A chow test was used to determine if separate models were needed for males and females. After running three separate models, one unrestricted and two restricted models, the -2 log likelihoods were used in the test. Table 22 presents the results for the 1999 Chow Test.

**Table 22. 1999 Chow Test**

Observation	LL	P	PROB
1	31.993	0.25736	0.74264

Source: Author

With a p-value of 0.74264, the null hypothesis that the models for men and women are the same could not be rejected and it was determined that only one model is necessary for males and females.

## **3. Response Profile**

Table 23 shows the response profile of the ordered value, frequency, and percent distribution of the dependent variable STAY.

**Table 23. 1999 Response Profile**

Ordered Value	STAY	Total Frequency	Total Percent
1	1	149	22.40
2	0	516	77.60

Source: Author

It is important to remember that the table represents the stay/leave behavior of the respondents of the 1999 Department of Defense survey and not those of all

individuals on active duty in 1999. For this sample, STAY was equal to 1 for 149 respondents, or 22 percent of the sample. Conversely, STAY was equal 0 for 516 respondents or 78 percent of the sample.

#### **4. Model Fit Statistics**

Table 24 illustrates the results of the model fit statistics. The lower the AIC and -2 Log L, the better the model fit is.

**Table 24. 1999 Model Fit Statistics**

<b>Criterion</b>	<b>Intercept only</b>	<b>Intercept and Covariates</b>
AIC	709.559	551.540
SC	714.058	646.035
-2 Log L	707.559	509.540

Source: Author

#### **5. Global Null Hypothesis Test**

The global null hypothesis tests BETA=0, or that the coefficients are equal to zero. If the significance value (p-value) is small, then the model as a whole is significant. Table 25 illustrates the results for the 1999 Global Null Hypothesis Test for STAY.

**Table 25. Global Null Hypothesis Test for STAY**

<b>Test</b>	<b>Chi-Square</b>	<b>DF</b>	<b>Pr &gt; Chi-Square</b>
Likelihood Ratio	198.0190	20	<.0001
Score	199.4619	20	<.0001
Wald	125.3105	20	<.0001

Source: Author

For this model, the likelihood ratio for the global null hypothesis test is equal to 707.559 - 509.540 or 198.019 with a p-value of <.0001 with 20 degrees of freedom. This indicates the model is significant and that

the model with covariates is better than the model with just the intercept.

### **6. R-Square**

The following table contains the R-Square and Max-rescaled R-Square for the 1999 model.

**Table 26. 1999 R-Square**

R-Square 0.2575	Max-rescaled R-Square 0.3932
Source: Author	

The generalized R-square is calculated as  $1 - \exp\{-(\frac{L^2}{n})\}$  where  $L^2$  is the likelihood ratio and  $n$  is the sample size.

$$R^2 = 1 - \exp\{-198.0190/665\} = .2575$$

The Max-rescaled R-square for this model shows that 39.32 percent of the variance in STAY can be explained by the independent variables used.

### **7. Classification Table**

The classification table, Table 27, shows a predicted response for each observation based on a predicted probability. Two cut-off values are shown. The response table (Table 23) indicated that there were 149 observations with STAY equal to 1, or 22 percent of the sample. The classification table indicates that at the .22 probability cut-off, the model predicts 73.1 percent of the observations correctly.

**Table 27. 1999 Classification Table**

Classification Table									
	Correct		Incorrect			Percentege			
Prob Level	Event	Non - Event	Event	Non - Event	Correct	Sensi-tivity	Speci-ficity	Fales Pos	False Neg
0.22	99	387	129	50	73.1	66.4	75.0	56.6	11.4
0.50	64	495	21	85	84.1	43.0	95.9	24.7	14.7

Source: Author

## 8. Interpretation of Coefficients

Table 28 contains the estimated regression coefficients for the 1999 model. The base case for this model is a white, male, ensign, who works less than 60 hours a week, assigned to a shore assignment, with debt less than 7,500 dollars, feels the probability of finding a good jog outside of the military is low, has the mean score of 4.08 (scale 1-5) for financial satisfaction, has the mean number of PCS moves (3.87), has no influence to STAY, and is married with dependents.

**Table 28. 1999 Logistic Regression Parameter Estimates**

Variable	Estimate	Standard Error	P-Value
<b>FEMALE**</b>	-0.8202	0.3731	0.0279
SNC(a)	0.3598	0.4377	0.2055
SWC(a)	-0.5623	1.4260	0.3467
MNC(a)	0.3480	0.4487	0.2190
HISPANIC(a)	-0.6444	0.6426	0.1580
BLACK(a)	-0.2400	0.5411	0.3287
LTJG	-0.3191	0.3100	0.3033
LT	-0.1421	0.3012	0.6370
<b>HOURS60TO80*</b>	0.5557	0.2890	0.0545
HOURS80MORE(a)	0.4846	0.4972	0.1649
SHIP	-0.2808	0.2739	0.3053
PCS	-0.0053	0.0158	0.7345
<b>INFLUENCE***</b>	2.6657	0.3141	<.0001
PROBJOB(a)	-0.3442	0.2917	0.1191
FINANCIAL	0.0558	0.1836	0.7612
DEBT7500TO15000(a)	0.0626	0.3207	0.4425
DEBTGRT15000(a)	-0.0995	0.3550	0.3896
<b>SERVICE ATTRIBUTES***</b>	1.1192	0.1879	<.0001
FUTURE ATTRIBUTES	0.0628	0.1948	0.7473
<b>PRESENT ATTRIBUTES*</b>	0.3096	0.1853	0.0947

\* Significant at the ten percent level

\*\* Significant at the five percent level

\*\*\* Significant at the one percent level

(a) one-tailed test

---

Source: Author

Of the 20 variables selected for the model INFLUENCE and the composite dimension variable, Service Attributes, variable were statistically significant at the .01 level. FEMALE was statistically significant at the .05 level. The variable HOURS60TO80 and the composite dimension variable, Present Employment Attribute, were statistically significant at the .10 level. The hypothesized effects in Table 9 are different than the actual effects for SNC, MNC, LTJG, LT, workweek variables, and DEBTGRT1500. SNC, MNC, and the workweek variables were hypothesized to lead to an Officer being less likely to remain on active duty but none of these are significantly different from zero except one of the workweek variables, HOURS60TO80. The composite dimension variables, Service Attributes, Future Employment Attributes, and Present Employment Attributes, were hypothesized to have a positive effect on retention. All three composite dimension variables had the expected coefficient signs (positive) except the Future Employment Attributes variable which was not statistically significant at any level of significance. The rank variables LTJG and LT were hypothesized to have a positive effect on retention which they did not. However, neither of these was significantly different from zero. The following paragraphs describe the significant and insignificant variables and whether the variables had the same effect on STAY as hypothesized.

**a. Gender**

FEMALE was statistically significant and had a negative effect on STAY. The negative effect supports the previous hypothesis that females are less likely than males to remain on active duty beyond their initial obligation.

**b. Family Status**

None of the family status variables were statistically significant at any level. Furthermore, the actual predicted effects of SNC and MNC were opposite than that of the hypothesized effects.

The SWC variable had only 4 observations equal to one which was less than one percent of the total observations and was statistically insignificant. It was hypothesized that SWC would be less likely to stay than the base case MWC. It is expected that the small number of observations contributed to the insignificance of this variable.

The MNC variable made up a fairly large proportion of the responses (21.63 percent), yet it too was insignificant. With a one-tailed test, MNC had a p-value of .21 which shows some significance in predicting retention; however, the positive sign shows that MNC are more likely to remain on active duty than the base case MWC. The insignificance of the variable could be a characteristic of the specific sample used in this study. If a different sample from the population were used, then the results of the test might have been different. Furthermore, the economy was thriving in 1999 and perhaps this decreased concerns about family financial responsibilities.

The SNC variable had the most observations of all of the family status variables. The SNC variable represented nearly 72.35 percent of the total family status observations, but it was also statistically insignificant. With a one-tailed test, the variable was significant at the .20 level of significance giving the SNC variable some

significance in predicting retention intentions; however, the model sign was not congruent to the hypothesized sign. Again, this could be a unique characteristic of this sample. Additionally, because of the growing economy in 1999, perhaps there was not much difference between SNC and the base case who were expected to have more concerns about family financial needs. In addition, the family status variables were not jointly significant as depicted in Table 29.

**Table 29. Joint Significance of SNC, SWC, and MNC**

Label	Chi-Square	DF	Pr > ChiSq
test_SNC_SWC_MNC	1.0933	3	0.7787

Source: Author

**c. Race**

Neither BLACK nor HISPANIC was statistically significant in the 1999 model. It was hypothesized that BLACK and HISPANIC would be more likely to remain on active duty than the base case. According to the model results, minority race/ethnic groups would be less likely to remain on active duty than the base case WHITE(OTHER). The BLACK variable made up 7.59 percent of the sample and HISPANIC made up 4.95 percent of the sample. It is expected that some observations for the minority race/ethnic group were dropped from the sample for confidentiality, and because of the already low proportion of observations, this may have contributed to the insignificance of these variables. The unexpected results could also be a characteristic of the specific sample used. Retention many not have been a concern to these Officers because transition to the civilian sector was easier during the strong economy of 1999. A different sample may have revealed a different

result. Table 30 shows the joint significance test for the minority variables.

**Table 30. Joint Test for HISPANIC and BLACK**

Label	Chi-Square	DF	Pr > ChiSq
test_HISPANIC_BLACK	1.1529	2	0.5619

Source: Author

***d. Rank***

The rank variables, LTJG and LT, were both statistically insignificant. It was hypothesized that these variables would have a positive effect on STAY and that a LTJG or LT would be more likely to remain on active duty than the base case ENS.

The LTJG and LT variables were similarly distributed in the sample making up 36.47 percent and 36.05 percent respectively. Again, the strong economy in 1999 could have influenced this result with the good opportunities to find employment in the civilian sector at that time. This is probably more likely for an Officer with the rank of LT who was preparing to finish his or her initial obligation. However, Officers with the rank of LTJG may also have been contemplating leaving the service thinking they too would be able to find a job in the civilian sector when their initial obligation was completed. Table 31 shows that the rank variables are not jointly significant.

**Table 31. Joint Significant Test of LTJG and LT**

Label	Chi-Square	DF	Pr > ChiSq
test_LTJG_LT	1.0944	2	0.5786

Source: Author

### e. Workweek

The workweek variables were interesting in the fact that one variable was statistically significant and the other was not. Also, both variables had the opposite sign from that hypothesized including the workweek variable that was statistically significant.

The variable measuring hours worked between 60 to 80, HOURS60TO80, was statistically significant at the .10 level, but it had the opposite sign than that hypothesized. This indicated that Officers who work 60 to 80 hours a week are more likely to remain on active duty than those who work less than 60 hours a week. The unexpected sign could simply mean that the Officers in the sample truly enjoyed their job, and that working longer hours was not detrimental to retention.

The variable measuring hours worked grater than 80, HOURS80MORE, was not statistically significant at the usual levels. However, the p-value of approximately .15 shows that the variable has some limited significance in predicting STAY. Nevertheless, the hypothesized sign and actual predicted sign were not congruent. Again, this could be because the Officers in this sample enjoyed their job, and were satisfied with the number of hours worked. The workweek variables were not jointly significant as shown in Table 32.

**Table 32. Joint Significant Test of Workweek Variables**

Label	Chi-Square	DF	Pr > ChiSq
test_ HOURS60TO80_ HOURS80MORE	3.8675	2	0.1446

Source: Author

**f. SHIP**

The ship variable was not statistically significant, but it did have the hypothesized sign. Using a one-tailed test, the p-value would be .15, indicating that this variable has some limited significance in explaining STAY.

**g. PCS**

The PCS variable was not statistically significant at any usual level of significance. It was hypothesized that the greater the number of PCS moves over, the more likely an Officer is to remain on active duty.

**h. INFLUENCE**

The INFLUENCE variable was statistically significant at the .01 level and had the hypothesized sign. The model supports the hypothesis that an Officer who has the influence of a family, friend or significant other has a greater probability of STAY than an Officer who has no INFLUENCE.

**i. PROBJOB**

The probability value of PROBJOB is approximately .12 using a one-tailed test. Furthermore, the variable had the hypothesized sign giving some support to the hypothesis that the probability of STAY is lower for an Officer who feels he or she can find a good civilian job than for an Officer who does not.

**j. FINANCIAL**

The FINANCIAL variable was not statistically significant at any usual levels of significance. It was hypothesized that if a servicemember is financially satisfied then he or she will be more likely to STAY.

**k. DEBT Variables**

The respondents whose debt was between 7,500 dollars and 15,000 dollars, DEBT7500TO15000, and whose debt was greater than 15,000 dollars, DEBTGRTR15000, made up 8.48 percent and 10.52 percent respectively of the sample. The debt variables were not statistically significant at any level of significance. It was hypothesized that debt greater than 7,500 dollars would have a positive effect on retention in that those Officers with a greater debt would be more likely to remain on active duty. The results could reflect the small number of respondents in these two debt groups.

Table 33 contains the joint significance test for the debt variables. Table 34 contains the joint significance test of the FINANCIAL variable and the debt variables. They show no evidence of joint significance for these variables.

**Table 33. Joint Significance Test for Debt Variables**

Label	Chi-Square	DF	Pr > ChiSq
test_Debt15000_DebtGRTR15000	0.1523	2	0.9267

Source: Author

**Table 34. Joint Significance Test for Debt Variable and FINANCIAL Variable**

Label	Chi-Square	DF	Pr > ChiSq
FINANCIAL_Debt15000_DebtGRTR15000	0.2708	3	0.9654

Source: Author

**1. Service Attributes**

The composite dimension, satisfaction with Service Attributes, included satisfaction with serving

country, training, and job security. This variable was significant at the .01 level and the hypothesized sign was congruent to the actual model sign showing a positive effect. This indicates that the more satisfied a servicemember is with the composite dimension, Service Attributes, the more likely he or she is to remain on active duty. The positive effect supports the previous hypothesis that these attributes are likely to positively influence a servicemember to remain on active duty beyond his or her initial obligation.

***m. Future Employment Attributes***

The composite dimension variable, Future Employment Attributes, consisted of satisfaction with job security and advancement. This variable was not significant at any level with a .7473 probability value. The explanation is not clear. However, the insignificance could support the theory mentioned for previous variable results, that Officers during this time period were not concerned with retention beyond their initial obligation because of the favorable civilian job market. Therefore, job security and advancement were not important to them.

***n. Present Employment Attributes***

The composite dimension, Present Employment Attributes, consisted of satisfaction with retirement benefits, basic pay, PCS moves, and free time. The Present Employment Attributes variable was significant at the .10 level of significance and had a positive effect on STAY. The positive effect supports the previous hypothesis that satisfaction with these attributes of present employment is likely to positively influence a servicemember to remain on active duty beyond his or her initial obligation.

## **9. 1999 Partial Effects**

Table 35 shows the partial effect of each individual independent variable in the 1999 model. Since the logistic regression coefficients do not provide a direct interpretation due to the non-linearity of the model, another method for obtaining partial effects must be used. To determine a "base case", a hypothetical individual was constructed with zeros as values for the binary variables and the mean as a value for continuous variables. The partial effect is the effect each independent variable has on a base case probability of staying when isolated and changed by one unit.

The base case for this model is a white, male, ensign, who works less than 60 hours a week, assigned to a shore assignment, with debt less than 7,500 dollars, feels the probability of finding a good jog outside of the military is low, has the mean score of 4.08 (scale 1-5) for financial satisfaction, has the mean number of PCS moves (3.87), has no influence to STAY, and is married with dependents. The base case probability for the 1999 model is .1420.

**Table 35. 1999 Partial Effect**

Variable Base Case	Prediction	Partial Effect
	0.1420	
<b>FEMALE**</b>	0.0679	-0.0741
SNC(a)	0.1917	0.0497
SWC	0.0862	-0.0558
MNC(a)	0.1899	0.0479
HISPANIC	0.0799	-0.0621
BLACK	0.1152	-0.0268
LTJG	0.1074	-0.0346
LT	0.1255	-0.0165
<b>HOURS60TO80*</b>	0.2239	0.0819
HOURS80MORE(a)	0.2118	0.0698
SHIP	0.0529	-0.0891
PCS	0.1413	-0.0006
<b>INFLUENCE***</b>	0.7041	0.5621
PROBJOB	0.1050	-0.0370
FINANCIAL	0.1555	0.0136
DEBT7500TO15000	0.1498	0.0078
DEBTGRT15000	0.1303	-0.0117
<b>SERVICE ATTRIBUTES***</b>	0.3363	0.1944
FUTURE ATTRIBUTES	0.1498	0.0078
<b>PRESENT ATTRIBUTES***</b>	0.1840	0.0421

\* Significant at the ten percent level

\*\* Significant at the five percent level

\*\*\* Significant at the one percent level

---

Source: Author

The variable FEMALE is significant at the five percent level of significance and has a negative effect on retention. The probability of a female to STAY is .07 percentage points lower than for the base case male, ceteris paribus.

The variable HOURS60TO80 is significant at the 10 percent level of significance and has a positive effect on retention. The probability of STAY is .08 percentage points higher for those who work 60 to 80 hours rather than the base case of 60 hours of work or less, ceteris paribus.

The variable INFLUENCE is statistically significant at the one percent level and has a positive effect on retention. The probability of STAY is .56 percentage points higher for an individual who has an INFLUENCE than for the base case, no INFLUENCE, ceteris paribus.

The composite dimension variable, Service Attributes, is significant at the one percent level of significance and has a positive effect on retention intentions. A one standard deviation increase in the average component score of this factor yields a .19 percentage point increase in STAY, ceteris paribus.

The composite dimension variable, Present Employment Attributes, is significant at the ten percent level of significance and has a positive effect on retention intentions. A one standard deviation increase in the average component score of this factor yields a .04 percentage point increase in STAY, ceteris paribus.

#### **D. DIFFERENCES AND SIMILARITIES BETWEEN THE 1992 MODEL AND THE 1999 MODEL**

The 1992 and 1999 models were created using similar variables from different survey years to capture determinates of intended retention. The results of the two models differed in many aspects; however, they were also similar in many ways. This section discusses distinct similarities and differences between the two models.

##### **1. Differences Between the 1992 Model and the 1999 Model**

The most striking difference between the two models is the number of variables that were statistically significant. This difference more than likely reflects the sample design and the significant characteristics of the time period such as the force drawdown in 1992 and the

strength of the economy in 1999. The two sample designs as discussed in chapter three were extremely different in composition (Table 7). The 1992 sample consisted of nearly 53 percent females, which is a large over representation of the female population in the Navy during this time period. Furthermore, the number of observations used in each model was different with nearly three times more used in the 1992 model. The 1992 model used 1,998 as compared to 665 used in 1999 model. The family status composition was different for each survey year as well. Those in the SNC category for the 1992 sample were nearly 57 percent of the total while in 1999 they made up nearly 73 percent of the total. Also, there were substantially more SWC observations in the 1992 data than the 1999 data. The debt variable was similar in both surveys; however, the 1992 data did have more Sailors with a higher percentage of debt over 7,500 dollars.

**a. Race**

The HISPANIC and BLACK variables were hypothesized to have a positive effect on STAY. Both data sets consisted of nearly 6 percent BLACK Officers, but HISPANIC Officers had less representation in the 1992 data than in the 1999 data. The only significant minority race/ethnic group variable for the two models was the BLACK variable at the .10 level of significance in the 1992 survey. In periods of high unemployment, the unemployment rate for minorities is usually greater than that of Whites. Black Officers may have been more concerned with finding a civilian job in 1992 when unemployment was high than in 1999 when the economy was stronger. Table 36 shows the differences between the two models for the minority race/ethnic variables.

**Table 36. Differences in the Race Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
HISPANIC	-0.2326	.2230	-0.6444	.1580
BLACK	0.0329	.0896	-0.2400	.3287

Source: Author

***b. Rank***

The Rank variables were not statistically significant in either model as shown in Table 37. This result was not expected because it was hypothesized that these variables would have a positive effect on STAY.

**Table 37. Differences in the Rank Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
LTJG	0.0970	.4912	-0.3191	.3033
LT	0.0693	.6253	-0.1421	.6370

Source: Author

***c. PCS***

The PCS variable was not congruent between models either. The 1992 model had a positive PCS coefficient that was statistically significant at the one percent level of significance. The model predicts that, as PCS increases, Sailors are more apt to STAY according to the 1992 model. The 1999 PCS variable was not statistically significant. The difference in the effect of PCS moves between the two periods has no obvious explanation, but may relate to the drawdown and base closures of the 1992 period. Table 38 shows the differences between the two models for the PCS variable.

**Table 38. Differences in the PCS Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
PCS	0.1769	< .0001	-.0053	.7345

Source: Author

**d. FINANCIAL**

The binomial variable, FINANCIAL, had different predicted effects in the two models. The 1992 model had a predicted negative effect and was statistically significant at the .01 level of significance. In the 1999 model, this variable was not statistically significant at any level of significance. This difference may indicate that FINANCIAL stability was not as important to the 1999 sample as to the 1992 sample. Table 39 shows the differences between the two models for the FINANCIAL Variable.

**Table 39. Differences in the FINANCIAL Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
FINANCIAL	-0.2576	<.0001	0.0558	.7612

Source: Author

**e. Debt**

The two models produced different effects for the debt variable. The variable DEBT7500TO15000, debt between 7,500 dollars and 15,000 dollars, had a predicted positive effect and was statistically significant in the 1992 model. However, the variable DEBT7500TO15000 was not statistically significant in the 1999 model. It was hypothesized that this variable would positively affect STAY.

The variable DEBTGRT15000, debt greater than 15,000 dollars, was statistically significant at the .10 level in the 1992 model. However, it was not significant

at any level in the 1999 model. Because of the strong economy in 1999, this difference may indicate that debt was not as important to the 1999 sample as it was to the 1992 sample in determining retention. Table 40 shows the differences between the two models for the debt variables.

**Table 40. Differences in the Debt Variables**

<b>Variable</b>	<b>1992</b>		<b>1999</b>	
	<b>Coefficient</b>	<b>p-value</b>	<b>Coefficient</b>	<b>p-value</b>
DEBT15000	0.1668	.0799	0.0626	.4425
DEBTGRT15000	0.1987	.0703	-0.0995	.3896

Source: Author

**f. Future Employment Attribute**

The composite dimension variable, Future Employment Attribute, had different effects in the two models. The 1992 model had a negative coefficient that was statistically significant at the .05 level while the 1999 model was not insignificant at any level. It is possible that because of the strong economy in 1999, future employment aspects of a military career were not as important to the 1999 sample as they were for the 1992 sample. Table 41 shows the differences between the two models for the composite dimension, Future Employment Attribute, variable.

**Table 41. Differences in the Future Employment Attribute variable**

<b>Variable</b>	<b>1992</b>		<b>1999</b>	
	<b>Coefficient</b>	<b>p-value</b>	<b>Coefficient</b>	<b>p-value</b>
Future	-0.1707	.0141	0.0628	.7473

Source: Author

**g. INFLUENCE**

The INFLUENCE variable was statistically significant in 1999, but not in 1992. However, using a one-

tailed test, the 1992 variable was significant at the .20 level, weakly supporting the hypothesis that INFLUENCE positively affects STAY behavior. The differences in the two years could be contributed to by the interpretation of the survey question or the lack of possible questionnaire responses for the 1992 survey. The 1992 survey asked how much influence does your spouse have on your decision to stay, but does not offer a response about a possible influence to leave. The 1999 survey allowed the respondent to indicate how much influence his or her spouse, girlfriend, or boyfriend has on his or her decision to stay on or leave active duty. Table 42 shows the differences between the INFLUENCE variables in the two models.

**Table 42. Differences in the INFLUENCE Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
INFLUENCE	0.2567	0.1960	2.6657	<.0001

Source: Author

#### ***h. SHIP***

The SHIP variable was hypothesized to have a negative effect on retention. However, it was statistically significant only for the 1992 model. Using a one-tailed test, the 1999 probability value is .15 which weakly supports the hypothesis that officers stationed onboard a ship are less likely to remain on active duty than those stationed at a shore assignment. The exact nature of differences is not clear, but the significance of the 1992 variable could be contributed to the drawdown period. Table 43 shows the differences between the SHIP variables in the two models.

**Table 43. Differences in the SHIP Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
SHIP	-0.4441	0.0036	-0.2808	.1526

Source: Author

*i. Workweek*

The workweek variable consisted of two variables, 60 to 80 hours of work (HOURS60TO80) and 80 hours or more (HOURS80MORE). The hypothesis was that an Officer who worked more than 60 hours a week would be less likely to STAY than an Officer who worked less than 60 hours a week.

Neither variable was statistically significant in the 1992 model. The insignificance of both 1992 variables could be a result of the weak economy and the force drawdown. The only workweek variable that was statistically significant was the HOURS60TO80 variable in the 1999 model at the .10 level. The positive coefficient indicates that an Officer who worked 60 to 80 hours a week is more likely to remain on active duty than an Officer who worked less than 60 hours. The positive affect of the HOURS60TO80 variable could be contributed to by high satisfaction with work or may be a unique aspect of the specific sample. HOURS80MORE was not statistically significant at any of the usual levels and appears to not be as important in determining retention behavior. Table 44 shows the differences between the workweek variables in the two models.

**Table 44. Differences in the Workweek Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
HOURS60TO80	0.1558	.1525	0.5557	.0545
HOURS80MORE	0.0969	.3239	0.4846	.1649

Source: Author

**j. PROBJOB**

The 1992 PROBJOB variable was statistically significant at the .10 level of significance. Because of the weak economy in 1992, the probability of finding a good civilian job was much more important. Conversely, the 1999 variable was not significant at the usual levels; however, it was statistically significant at the .12 level of significance limiting its effect on STAY and weakly supporting the hypothesis that PROBJOB negatively affects retention. Table 45 shows the differences in the results for the PRBJOB variable in the two models.

**Table 45. Differences in the PROBJOB Variable**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
PROBJOB	-0.1534	.0787	-0.3442	.1191

Source: Author

**2. Similarities Between the 1992 Model and the 1999 Model**

There were more differences between the two samples than similarities. However, one similarity is the target population of the two samples. Both models were restricted to junior naval officers, between the rank of Ensign and Lieutenant, with less than six years active duty.

Model results were similar for the effects that the composite dimension variable, Service Attributes, the

composite dimension variable, Present Employment Attributes, and Female had on STAY. All of these variables were statistically significant, the predicted results were similar in each model, and the coefficients had the hypothesized sign.

**a. Service Attributes**

The composite dimension variable, Service Attributes, was statistically significant at the .01 level and had the hypothesized effect in both the 1992 model and the 1999 model. Of all the variables used in this study, the composite dimension variable, Service Attributes, was the only variable to affect STAY in both models that was statistically significant at the .01 level of significance. The model prediction matches the hypothesized effect and substantiates that satisfaction with job, service to country, and training positively affect retention behavior more than any other variable in the two models. Again, one must remember that these are characteristics of the survey respondents used in this study, and not those of the entire military service in 1992 and 1999. Table 46 shows the Similarities in the composite dimension variable, Service Attributes, in the two models.

**Table 46. Similarities in the Composite Dimension Variable, Service Attributes**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
Service Attributes	0.7692	<.0001	1.1192	<.0001

Source: Author

**b. FEMALE**

The female variable is the second consistent and prominent variable in predicting planned STAY behavior for

the 1992 and 1999 models based on the survey respondents. It was hypothesized that this variable would have a negative effect on retention and, according to the model results, it does. The hypothesis that females were less likely to remain on active duty than males was based on previous military retention studies and literature review. All of the previous studies reviewed in chapter two have found that females were less likely to remain on active duty than males.

For the 1992 model, FEMALE was statistically significant at the .01 level, and for the 1999 model it was statistically significant at the .05 level. Table 47 shows the similarities in the two models for the FEMALE variable.

**Table 47. Similarities in the Female Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
FEMALE	-0.3060	.0060	-0.8202	.0279

Source: Author

**c. Present Employment Attributes**

The composite dimension variable, Present Employment Attributes, was not as significant as the Service Attributes variable. However, it too was statistically significant in both models, showing that it affected the intended STAY behavior of the survey respondents used in this study. The Present Employment variable was statistically significant at the .01 level in 1992 and was significant at the .10 level for the 1999 model. In both models it had the hypothesized positive effect on STAY. Table 48 shows the similarities between the variable for the composite dimension, Present Employment Attributes, in the two models.

**Table 48. Similarities in the Present Employment Attributes Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
Present Employment	0.5859	<.0001	0.3096	.0947

Source: Author

**d. Family Status**

Table 49 shows that, as discussed in earlier sections, none of the family status variables were significant at any level of significance. This unexpected result could have been contributed to by the differences in the time periods of these two surveys, but the exact nature of such effects is not clear.

**Table 49. Family Status Variables**

Variable	1992		1999	
	Coefficient	p-value	Coefficient	p-value
SNC	0.0709	.4099	0.3598	.2055
SWC	0.3020	.3340	-0.5623	.3467
MNC	-0.0776	.3134	0.3480	.2190

Source: Author

THIS PAGE INTENTIONALLY LEFT BLANK

## V. CONCLUSIONS AND RECOMMENDATIONS

The plan behind this thesis was to identify differences in characteristics that influence retention, given similar variables from different years in controlled models. By comparing the 1992 Department of Defense survey and the 1999 Department of Defense survey, this thesis was able to determine what variables significantly influenced retention in both survey years and which variables significantly influenced retention in just one year. The samples for this study were from a similar target population (Naval Officers), but different time periods. Furthermore, the variables were created from separate surveys using similar questions with similar response choices as discussed in chapter three.

Retention influences play an important role in the continuing struggle to retain top notch Sailors. This thesis looked at retention influences over two distinct time periods to determine which retention influences remained constant and which changed over time. This thesis used the characteristics of junior naval Officers, under the rank of lieutenant, with less than six years of active duty service to determine what influenced the intended stay/leave behavior of junior naval Officers. The models included intrinsic and extrinsic characteristics specific to military attributes. The same model specification was used for both surveys. Logistic regression was used to estimate the models because the dependent variable, STAY, was dichotomous.

#### A. CONCLUSIONS

Several variables were statistically significant in both models. The two most prominent were the composite dimension, Service Attributes, and the FEMALE variable. Both of these variables were statistically significant at the .05 level of significance and both variables were congruent with their hypothesized effect. The composite dimension, Present Employment Attributes, was also significant in both models and was congruent with the hypothesized effect; however, this variable had a weaker significance level in 1999 (.10 significance) than in 1992.

The composite dimension variable, Future Employment Attributes, was significant in the 1992 model only. However, the hypothesized effect was not congruent with the model results. It was hypothesized that this variable would positively affect retention if servicemembers were satisfied with this composite dimension. The unexpected results could be the contribution of the force drawdown, collinearity with other variables, or unique characteristics of the respondents of the survey. The composite dimension variable, Future Employment Attributes, was not significant in the 1999 model.

The family status variables were not significant in either model. It was expected that these variables would play a large role in determining retention. However, as the model indicated, none of them were statistically significant at any of the usual levels of significance.

The race variables also had unexpected results. It was hypothesized that these individuals who are members of minority race/ethnic groups would be more likely to remain on active duty than white Officers. The 1992 BLACK

variable was statistically significant at the .10 level of significance. The other minority race/ethnic group variables were not statistically significant at any level of significance.

The rank variables were not significant in either model. It was expected that these variables would have a positive effect in determining retention intentions. However, as the model indicated, none of them were statistically significant at any of the usual levels of significance.

The INFLUENCE variable, which measured whether or not an individual had influence from a family member, friend or significant other to STAY, was statistically significant in 1999, but not in 1992. However, using a one-tailed test, the 1992 variable was significant at the .20 level of significance, weakly supporting the hypothesis that INFLUENCE positively affects STAY behavior. This was a bit surprising because it contrasts with the results of retention models reviewed in previous studies. It was expected that INFLUENCE would have a greater impact on retention than it did. However, this may have had to do with the interpretation of the question by survey respondents or may just be a unique characteristic of the 1992 sample.

The probability of finding a good civilian job, PROBJOB, was significant only in the 1992 model. This variable had a negative coefficient as anticipated and was statistically significant at the .10 level. The 1999 PROBJOB variable was not statistically significant at any level.

The workweek variables had no influence on retention with the exception of the 1999 variable, HOURS60TO80, which was statistically significant at the .10 level of significance. It was hypothesized that the greater the number of hours worked over 60 hours, the less likely a Sailor would be to remain on active duty, but for 1999, the estimate's sign was positive. It is suspected that collinearity may have masked some of the true influence of this variable, since the composite dimension, Present Employment Attributes, was highly significant and collinear with hours worked. Furthermore, the significant differences of the two time periods, both economically and related to new military policies affecting end-strength, may have led to additional inconsistency.

The debt variables consisted of debt of 7,500 dollars to 15,000 dollars (DEBT7500TO1500) and debt greater than 15,000 dollars (DEBTGRT15000). Both variables were statistically significant at the .10 level and congruent with the hypothesized effect in the 1992 model. However, neither variable was significant at any of the usual levels in the 1999 model.

The FINANCIAL variable was significant in the 1992 model only. However, the hypothesized effect was not congruent with the model result. It was hypothesized that if a servicemember was satisfied with his or her finances, then he or she would be more likely to remain on active duty. The 1992 model predicted otherwise. This variable showed signs of collinearity with the composite dimension variable, Present Employment Attributes, which consisted of satisfaction with pay and retirement benefits. Because of this, it appears multicollinearity may have masked the true

effect of the FINANCIAL variable. The 1999 FINANCIAL variable was not significant at any of the usual levels.

The PCS variable, which measures the number of PCS moves, was significant only in the 1992 model. This variable had a positive coefficient as anticipated and was highly significant at the .01 level. The 1999 PCS variable was not significant at any level.

The SHIP variable was statistically significant in the 1992 model but not in the 1999 model. It was hypothesized that an Officer stationed onboard a ship would be less likely to remain on active duty than an Officer not stationed onboard a SHIP. The 1992 model results were congruent with a statistically significant negative coefficient. However, the 1999 SHIP variable was not significant at any of the usual levels of significance.

Lastly, it appears that monetary variables (debt, FINANCIAL, PROBJOB, present pay, and future pay) were highly significant and effective in determining retention intentions in the 1992 sample. Conversely, the only monetary variable significant in the 1999 model was present pay which was included in the composite dimension, Present Employment Attributes, variable. This finding could be due to the differing characteristics of the two distinct time periods or simply a unique characteristic of the specific samples used in this research. However, with a weaker economy in 1992, base closures occurring, and the force drawdown policy taking effect, it is this author's belief that the results are more likely to be associated with the time period rather than the sample.

## **B. POLICY IMPLICATIONS**

Today more than ever, the military is facing retention problems throughout the services. As the role of the military changes and the emphasis shifts towards fighting terrorism, military personnel are feeling the effects of long deployments and increased operational tempos. The ability to retain junior service members is a growing concern. It is incumbent on senior naval personnel to see to it that programs are set in place to correct this potential retention problem.

This thesis indicates that females are more likely to leave the military than males and that Service attributes such as job enjoyment, training, and pride of serving ones country highly influence retention. Programs that positively impact the characteristics that influence female retention should be highly encouraged. The Defense authorization act in 1994 allowing females to serve onboard war ships and fly combat aircraft is just the beginning. Although the 1992 survey could not capture any of these changes, the 1999 survey should have. It is important to ensure that career paths are set up to help guide junior Navy female Officers and ensure they are accepted into highly competitive occupations to ensure retention. Furthermore, as Hosek (2001) points out, female Officers often feel that the Navy has not figured out what to do with them. If approximately 15 percent of the United States Navy feels this way, then it is important to ensure the United States Navy does "figure out" what to do with females. The experience of this author has seen that females are as capable as any male Officer to perform in

countless occupations the Navy has to offer. More emphasis should be placed on expanding access for women to more occupational fields in order to open the door for more competitive careers for women.

Pay is probably the largest influence on retention. Although this particular study does not show that pay by itself is important, the significance of the composite dimension, Present Employment Attributes, encompasses it and previous studies have supported it. Although pay is structured by rank, more competitive fields such as aviation, special warfare teams, and Nuclear Officers benefit highly from incentives. The recent Surface Warfare incentive policy has increased the opportunity for females to receive incentive pay. However, most career fields that offer these incentives are male dominated and some are closed to female Officers. This is another aspect of occupation related policies that should be considered.

Lastly, family is related to many of the variables used in this study such as the family status variables, influence, debt, and financial well-being. These areas should be of great concern to the United States military. Recent changes such as the privatization of family housing have improved the living conditions of married servicemembers. Perhaps the opportunities for housing should be opened to single servicemembers as well. This would not only benefit the financial struggle of the single sailor to find a place to live, but also help foster that single sailor in a military environment.

#### **C. FUTURE RESEARCH**

The 1992 Department of Defense survey and the 1999 Department of Defense Survey were administered during two

distinct and different time periods. Over these time periods the military was facing significant policy changes for dealing with a substantially different set of world events.

In 1992, the Department of Defense, specifically the Department of the Navy, began an aggressive downsizing. During this time period the economy was experiencing a recession where the unemployment rate was high with a low job growth rate. Furthermore, many Sailors were returning home from extended arduous deployments with many coming from combat zones. The 1999 time frame was relatively different in that the economy was doing well, the unemployment rate was lower, and the rate of new job growth was increasing. The 2006 Department of Defense survey will cover another unique time period, one similar to the 1992 with respect to a period of war and a recession prevalent during a better part of the time period.

The 2006 survey will cover a period of time during which an all voluntary force, who self selected the military service, enlisted or were commissioned during a time of war. Because the Persian Gulf War in 1991 was so short, very few servicemembers enlisted or were commissioned during the actual war. Today's events however are much different. Operation Enduring Freedom has encompassed a period of two years from the date of this thesis. Unlike periods of military conscription, there are non-monetary attributes that entice servicemembers to join the military.

To improve this study, future research addressing all three surveys, including the 2006 survey, will hopefully shed some light on these non-monetary attributes that

entice youth to enlist or seek commissions in the United States Military, particularly the Department of the Navy. The Marine Corps and the United States Army have recently reported problems with recruiting. If the problems persist for the Marine Corps it will be the first missed goal in over ten years. There is a feeling in Washington, as well as throughout the services, that recruitment is going to be the toughest war the military faces for the next few years. It is important to identify what characteristics influence retention so that the Navy can keep qualified Sailors onboard ships. With signs of decreasing intentions to join, recruiting costs to enlist and commission servicemembers will increase. Hopefully, the 2006 survey will shed light on intentions, both why servicemembers voluntarily joined the military, and what retention characteristics kept qualified Sailors.

THIS PAGE INTENTIONALLY LEFT BLANK

## LIST OF REFERENCES

1. Ashcraft, Raymond J. (1987). *An Analysis of the factors affecting the career orientation of Junior URL Naval Officers*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.
2. Bartel, Ann P. and Nachum Sicherman. (1999). *Technological Change and the Skill Acquisition of Young Workers*. National Bureau of Economic Research, Inc.
3. Clemens, Gabriel T. (2002). *An Analysis of Factors Affecting the Retention Plans of Junior US Navy Officers*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.
4. CNO Guidance for 2003, Navy Publications. (2002) *CNO Top Five Priorities*. Accessed 25 Feb 2004. <http://www.chinfo.navy.mil/navpalib/cno/cno-top5manpwr.html>
5. Cotton, John L., Jeffrey M. Tuttle. (1986). *Employee Turnover: A Meta-Analysis and Review with Implications for Research*. Academy of Management Review, Vol. 11, No. 1, pp. 55-70.
6. Cymrot, Donald J. and Kletus S. Lawler. (1990). *Qualification of Surface Warfare Officers*. Alexandria, VA: Center for Naval Analyses, CRM 89-316.
7. Defense Manpower Data Center. (1994). *The 1992 Surveys of Officers and Enlisted Personnel and their spouses: Overviews and Executive summaries*. Arlington Virginia, VA.
8. Doering, Zahava D. and Grissmer, and David W. Grissmer. 1985). *Active and Reserve Force Attrition and Retention: A Selected Review of Research and Methods*. Santa Monica, CA: RAND Corporation.
9. Ehrenberg, Ronald G. and Robert S. Smith. (2003). *Modern Labor Economics Theory and Public Policy*. New York, NY: Addison-Wesley.
10. Fernandez, Rosa M. and Esturo Shioji. (2000). *Human Capital in the Presence of Unemployment*. Institute of Economics and Statistics Oxford.

11. GAO Report. *Preliminary Results of DOD's 1999 Survey of Active Duty Members*. (GAO/T-NS1AD-00-110) United States General Accounting Office: Washington D.C.
12. Gencer, Umitt. (2002). *An Analysis of Factors Affecting the Retention Plans of Junior Male U.S. Army Officers: Evidence from the 1999 DoD Survey of Active Duty Personnel*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.
13. Grissmer, David W., Sheila Nataraj Kirby, and Man-bing Sze. (2004). *Factors Affecting Reenlistment of Reservists: Spouse and Employer Attitudes and Perceived Unit Environment*. Santa Monica, California: RAND, R-4011-RA.
14. Hairston, Reginald L. (2004). *Continuation Rates for Staff Noncommissioned Officers, in a Non-obligor Status, Serving in the Selected Marine Corps Reserve*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.
15. Horning, Bruce C. (1994). *Labor Hoarding and the Business Cycle*. International Economic Review, vol. 35, Issue 1, pp 87-100.
16. Hosek, S.D., Tiemeyer, P., Kilburn, R., Strong, D.A., Ducksworth, S., and Ray, R. (2001). *Minority and gender differences in officer career progression*. (RAND No. MR-1184 OSD). Santa Monica, CA: RAND Corporation.
17. Jenkins, Michael J. (1993). *Self-monitoring and turnover: The impact of personality on the intent to leave*. Journal of Organizational Behavior, Vol. 14, pp. 82-89.
18. Johnston, Ian. (1998). *Turnover of Junior Army Officers: a Test of the Mobley, Griffeth, Hand and Meglino Model of Personnel Turnover, using Structural Equation Techniques*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.

19. Kastner, Kurt A. (1997). *Career intentions of Junior Unrestricted Line Naval Officers*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.
20. Kirby, Sheila N. and Scott Naftel. (1998). *The Effect of Mobilization on Retention of Enlisted Reservists After Operation Desert Shield/Storm*. (RAND No. RN-7519-OSD). Santa Monica, CA: RAND Corporation.
21. Kocher, Kathryn and George Thomas. (1990). *Gender Differences in the Retention of Enlisted Army Reserve*. Naval Postgraduate School, Monterey, CA.
22. Mackin, P. C., Hogan, P. F. and L. S. Mairs. (1993). *A Multiperiod Model of US Army Officer Retention Decisions*. (ARI Technical Report 93-03). Alexandria, VA: US Army Research Institute for the Behavioral and Social Sciences.
23. Mehay, Stephen L. (1995) Analysis of Performance Data for Junior Navy and Marine Corps Officers. Naval Postgraduate School, Monterey, CA.
24. Mobley, W.H. (1977). *Intermediate Linkages in the Relationship between Job Satisfaction and Employee Turnover*. Journal of Applied Psychology. Vol. 62, pp. 237-240.
25. Mobley, W.H., R.W Griffeth, H.H. Hand, and B.M. Meglino. (1997). *Review and Conceptual Analysis of the Employee Turnover Process*. Psychological Bulletin, Vol. 86, pp. 493-522.
26. Nakada, Michael K., Patrick C. Mackin, and Christopher D. Mackie. (1996). *Nuclear Officer Retention: MSR and Beyond*. San Diego, CA: Naval Personnel and Development Center.
27. North, James H., Dan D. Goldhaber, with Kletus S. Lawler, and Jeremy N. Suess. (1995). *Successful Officer Careers: Analysis of Augmentation, Promotion, and Voluntary Continuation*. Alexandria, VA: Center for Naval Analyses. CRM 95-55.

28. Office of the Assistant Secretary of Defense. (1992). *Population Representation in the Military Service*. Washington DC: Defense Technical Information Center.
29. Office of the Assistant Secretary of Defense. (1999). *Population Representation in the Military Service*. Washington DC: Defense Technical Information Center.
30. Pettman, B.D. (1973). *Some factors influencing labor turnover: A review of the literature*. Industrial Relations Journal, Vol. 4: pp. 43-61.
31. Price, James L.(1977). *The study of Turnover*. Ames Iowa: The State University Press.
32. Royle, Marjorie H. and Robertson, and W. David. (1980). *Job Satisfaction Measures As Predictors of Retention for Navy Enlisted Personnel*. Millington, TN: Naval Personnel Research and Development Center.
33. UCLA Academic Technology Service. *Resources to help you learn and use SAS*. Accessed 12 February 2005. [http://www.ats.ucla.edu/stat/sas/seminars/sas\\_logistic/logistic1.htm](http://www.ats.ucla.edu/stat/sas/seminars/sas_logistic/logistic1.htm)
34. Warner J.T. and M.S. Goldberg. (1984). *The Influence of Non-Pecuniary Factors on Labor Supply: The Case of Navy Enlisted Personnel*. Review of Economic and Statistics, Vol. 66, pp. 26-25.
35. Wooldridge, Jeffery M. (2003). *Introductory to Econometrics*. Ohio: South-Western.
36. Zinner, Marc A. (1997). *U.S. Marine Corps Company-Grade Officer Retention*. Unpublished Master's Thesis, Naval Postgraduate School, Monterey, CA.

## **INITIAL DISTRIBUTION LIST**

1. Defense Technical Information Center  
Ft. Belvoir, Virginia
2. Dudley Knox Library  
Naval Postgraduate School  
Monterey, California
3. Professor Kathy Kocher  
Naval Postgraduate School  
Monterey, California
4. Professor George Thomas  
Naval Postgraduate School  
Monterey, California